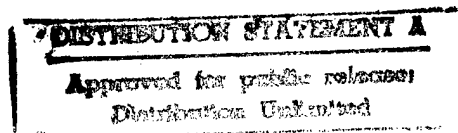


**APPENDIX F**

**SYSTEM SIMULATION  
COMPUTER RUNS**

***Volume IV***



933702

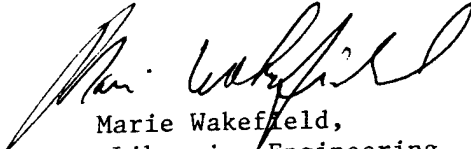


DEPARTMENT OF THE ARMY  
CONSTRUCTION ENGINEERING RESEARCH LABORATORIES, CORPS OF ENGINEERS  
P.O. BOX 9005  
CHAMPAIGN, ILLINOIS 61826-9005

REPLY TO  
ATTENTION OF: TR-I Library

17 Sep 1997

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Distribution A. Approved for public release.

  
Marie Wakefield,  
Librarian Engineering

*Building 318*

*Trace Input File*

19971017 078

CONTENTS OF : E:\CB318.TM

LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 318

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/BASE BUILDING

13 20/1/1/LIVING ROOM/254/1/1/.8/.45/10.7

14 20/2/1/DINING ROOM/209/1/1/.8/.45/10.7

15 20/3/1/BEDROOM/248/1/1/.8/.45/10.8

16 20/4/1/BEDROOM/116/1/1/0//10.8

17 20/5/1/STUDY/228/1/1/0//8.5

18 20/6/2/KITCHEN/175/1/1/.8/.45/10.7

19 20/7/2/LAUNDRY/22/1/1/.8/.45/10.7

20 20/8/2/BEDROOM/157/1/1/.8/.45/10.8

21 20/9/2/BATH/41/1/1/0//10.8

22 20/10/2/BATH/47/1/1/0//8.5

23 21/M////CBLQTX///CBLQTX

24 22/3/1/NO/82/1//171

25 22/4/1/YES////171

26 22/5/1/YES////159

27 22/8/1/NO/66/1//171

28 22/9/1/YES////171

29 22/10/1/YES////159

30 24/1/1/19/9.75//167/20

31 24/1/2/13/9.75//167/110

32 24/2/1/14/9.75//167/110

33 24/3/1/19/9.8//167/20

34 24/3/2/14.7/9.8//167/110

35 24/4/1/13.7/9.8//167/110

36 24/4/2/8.7/9.8//167/200

37 24/5/1/14.7/7.5//167/20

38 24/5/2/13.7/7.5//167/110

39 24/5/3/3/7.5//167/290

40 24/6/1/14/9.75//167/110

41 24/6/2/9.3/9.75//167/200

42 24/7/1/4.3/9.75//167/110

43 24/7/2/4.3/9.75//167/200

44 24/8/1/11/9.8//167/110

45 24/8/2/4.3/9.8//167/200

46 24/9/1/5.3/9.8//167/200

47 24/10/1/5/7.5//167/110

48 25/1/1/5.5/2/2/.55/.57

49 25/1/2/5.5/2/1/.55/.57

50 25/2/1/8/6/1/.55/.57

51 25/3/1/5.5/2.25/3/.55/.57

52 25/3/2/5.5/2/1/.81/.64

53 25/4/1/5.5/2.25/1/.55/.57

54 25/4/2/5.5/2.25/1/.55/.57

55 25/5/1/3.5/1.25/2/.81/.64

56 25/6/1/4/2.25/1/.55/.57

57 25/6/2/4/2.25/1/.55/.57

58 25/7/2/5.5/1.75/1/.55/.57

DTIC QUALITY INSPECTED 2



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LINE #	-----
59	25/8/1/5.5/2.25/1/.55/.57
60	25/8/2/5.5/1.75/1/.55/.57
61	25/9/1/5.5/1.5/1/.55/.57
62	25/10/1/3/1.25/1/.81/.64
63	26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
64	27/M/374/SF-PERS/230/190/.5/WATT-SF/INCAND
65	29/1////////.32/CFM-SF/.32/CFM-SF
66	29/2////////.32/CFM-SF/.32/CFM-SF
67	29/3////////.32/CFM-SF/.32/CFM-SF
68	29/4////////.32/CFM-SF/.32/CFM-SF
69	29/5////////.32/CFM-SF/.32/CFM-SF
70	29/6////////.32/CFM-SF
71	29/7////////.32/CFM-SF
72	29/8////////.32/CFM-SF
73	29/9////////.32/CFM-SF
74	29/10////////.32/CFM-SF
75	SYSTEM - 1
76	39/1/BASE BUILDING
77	40/1/PTAC
78	41/1/1/1
79	42/1/.2
80	45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
81	40/2/RAD
82	41/2/1/2
83	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
84	EQUIPMENT - 1
85	59/1/CARLISLE///BASE BUILDING
86	60/1/1/PKPLANT/1/1
87	62/1/EQ1161/8
88	65/1/1/2/2
89	67/1/EQ2102/1
90	69/1/EQ4003
91	LOAD - 2
92	19/2/WALL & ROOF INSULATION
93	20/1/1/LIVING ROOM/254/1/1/.8/.45/10.7
94	20/2/1/DINING ROOM/209/1/1/.8/.45/10.7
95	20/3/1/BEDROOM/248/1/1/.8/.45/10.8
96	20/4/1/BEDROOM/116/1/1/0//10.8
97	20/5/1/STUDY/228/1/1/0//8.5
98	20/6/2/KITCHEN/175/1/1/.8/.45/10.7
99	20/7/2/LAUNDRY/22/1/1/.8/.45/10.7
100	20/8/2/BEDROOM/157/1/1/.8/.45/10.8
101	20/9/2/BATH/41/1/1/0//10.8
102	20/10/2/BATH/47/1/1/0//8.5
103	21/M////CBLQTX///CBLQTX
104	22/3/1/NO/82/1//191
105	22/4/1/YES////191
106	22/5/1/YES////125
107	22/8/1/NO/66/1//191
108	22/9/1/YES////191
109	22/10/1/YES////125
110	24/1/1/19/9.75//126/20
111	24/1/2/13/9.75//126/110
112	24/2/1/14/9.75//126/110
113	24/3/1/19/9.8//126/20
114	24/3/2/14.7/9.8//126/110
115	24/4/1/13.7/9.8//126/110
116	24/4/2/8.7/9.8//126/200

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LINE #	CONTENTS
117	24/5/1/14.7/7.5//126/20
118	24/5/2/13.7/7.5//126/110
119	24/5/3/3/7.5//126/290
120	24/6/1/14/9.75//126/110
121	24/6/2/9.3/9.75//126/200
122	24/7/1/4.3/9.75//126/110
123	24/7/2/4.3/9.75//126/200
124	24/8/1/11/9.8//126/110
125	24/8/2/4.3/9.8//126/200
126	24/9/1/5.3/9.8//126/200
127	24/10/1/5/7.5//126/110
128	25/1/1/5.5/2/2/.55/.57
129	25/1/2/5.5/2/1/.55/.57
130	25/2/1/8/6/1/.55/.57
131	25/3/1/5.5/2.25/3/.55/.57
132	25/3/2/5.5/2/1/.81/.64
133	25/4/1/5.5/2.25/1/.55/.57
134	25/4/2/5.5/2.25/1/.55/.57
135	25/5/1/3.5/1.25/2/.81/.64
136	25/6/1/4/2.25/1/.55/.57
137	25/6/2/4/2.25/1/.55/.57
138	25/7/2/5.5/1.75/1/.55/.57
139	25/8/1/5.5/2.25/1/.55/.57
140	25/8/2/5.5/1.75/1/.55/.57
141	25/9/1/5.5/1.5/1/.55/.57
142	25/10/1/3/1.25/1/.81/.64
143	26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
144	27/M/374/SF-PERS/230/190/.5/WATT-SF/INCAND
145	29/1/////28/CFM-SF/.28/CFM-SF
146	29/2/////28/CFM-SF/.28/CFM-SF
147	29/3/////28/CFM-SF/.28/CFM-SF
148	29/4/////28/CFM-SF/.28/CFM-SF
149	29/5/////28/CFM-SF/.28/CFM-SF
150	29/6/////28/CFM-SF
151	29/7/////28/CFM-SF
152	29/8/////28/CFM-SF
153	29/9/////28/CFM-SF
154	29/10/////28/CFM-SF
155	SYSTEM - 2
156	39/2/WALL & ROOF INSULATION
157	40/1/PTAC
158	41/1/1/1
159	42/1/.2
160	45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
161	40/2/RAD
162	41/2/1/2
163	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
164	EQUIPMENT - 2
165	59/2/CARLISLE///WALL & ROOF INSULATION
166	60/1/1/PKPLANT/1/1
167	62/1/EQ1161/8
168	65/1/1//2/2
169	67/1/EQ2102/1
170	69/1/EQ4003
171	LOAD - 3
172	19/3/WEATHERSTRIP & CAULKING
173	20/1/1/LIVING ROOM/254/1/1/.8/.45/10.7
174	20/2/1/DINING ROOM/209/1/1/.8/.45/10.7

CONTENTS OF : E:\CB318.TM

LINE #	
175	20/3/1/BEDROOM/248/1/1/.8/.45/10.8
176	20/4/1/BEDROOM/116/1/1/0//10.8
177	20/5/1/STUDY/228/1/1/0//8.5
178	20/6/2/KITCHEN/175/1/1/.8/.45/10.7
179	20/7/2/LAUNDRY/22/1/1/.8/.45/10.7
180	20/8/2/BEDROOM/157/1/1/.8/.45/10.8
181	20/9/2/BATH/41/1/1/0//10.8
182	20/10/2/BATH/47/1/1/0//8.5
183	21/M////CBLQTX//CBLQTX
184	22/3/1/NO/82/1//171
185	22/4/1/YES////171
186	22/5/1/YES////159
187	22/8/1/NO/66/1//171
188	22/9/1/YES////171
189	22/10/1/YES////159
190	24/1/1/19/9.75//167/20
191	24/1/2/13/9.75//167/110
192	24/2/1/14/9.75//167/110
193	24/3/1/19/9.8//167/20
194	24/3/2/14.7/9.8//167/110
195	24/4/1/13.7/9.8//167/110
196	24/4/2/8.7/9.8//167/200
197	24/5/1/14.7/7.5//167/20
198	24/5/2/13.7/7.5//167/110
199	24/5/3/3/7.5//167/290
200	24/6/1/14/9.75//167/110
201	24/6/2/9.3/9.75//167/200
202	24/7/1/4.3/9.75//167/110
203	24/7/2/4.3/9.75//167/200
204	24/8/1/11/9.8//167/110
205	24/8/2/4.3/9.8//167/200
206	24/9/1/5.3/9.8//167/200
207	24/10/1/5/7.5//167/110
208	25/1/1/5.5/2/2/.55/.57
209	25/1/2/5.5/2/1/.55/.57
210	25/2/1/8/6/1/.55/.57
211	25/3/1/5.5/2.25/3/.55/.57
212	25/3/2/5.5/2/1/.81/.64
213	25/4/1/5.5/2.25/1/.55/.57
214	25/4/2/5.5/2.25/1/.55/.57
215	25/5/1/3.5/1.25/2/.81/.64
216	25/6/1/4/2.25/1/.55/.57
217	25/6/2/4/2.25/1/.55/.57
218	25/7/2/5.5/1.75/1/.55/.57
219	25/8/1/5.5/2.25/1/.55/.57
220	25/8/2/5.5/1.75/1/.55/.57
221	25/9/1/5.5/1.5/1/.55/.57
222	25/10/1/3/1.25/1/.81/.64
223	26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
224	27/M/374/SF-PERS/230/190/.5/WATT-SF/INCAND
225	29/1/////27/CFM-SF/.27/CFM-SF
226	29/2/////27/CFM-SF/.27/CFM-SF
227	29/3/////27/CFM-SF/.27/CFM-SF
228	29/4/////27/CFM-SF/.27/CFM-SF
229	29/5/////27/CFM-SF/.27/CFM-SF
230	29/6/////27/CFM-SF
231	29/7/////27/CFM-SF
232	29/8/////27/CFM-SF

CONTENTS OF : E:\CB318.TM

LINE # -----

233 29/9////////.27/CFM-SF

234 29/10////////.27/CFM-SF

235 SYSTEM - 3

236 39/3/WEATHERSTRIP & CAULKING

237 40/1/PTAC

238 41/1/1/1

239 42/1/.2

240 45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF

241 40/2/RAD

242 41/2/1/2

243 45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF

244 EQUIPMENT - 3

245 59/3/CARLISLE//WEATHERSTRIP & CAULKING

246 60/1/1/PKPLANT/1/1

247 62/1/EQ1161/8

248 65/1/1/2/2

249 67/1/EQ2102/1

250 69/1/EQ4003

251 LOAD - 4

252 19/4/COMBINED ECOS

253 20/1/1/LIVING ROOM/254/1/1/.8/.45/10.7

254 20/2/1/DINING ROOM/209/1/1/.8/.45/10.7

255 20/3/1/BEDROOM/248/1/1/.8/.45/10.8

256 20/4/1/BEDROOM/116/1/1/0//10.8

257 20/5/1/STUDY/228/1/1/0//8.5

258 20/6/2/KITCHEN/175/1/1/.8/.45/10.7

259 20/7/2/LAUNDRY/22/1/1/.8/.45/10.7

260 20/8/2/BEDROOM/157/1/1/.8/.45/10.8

261 20/9/2/BATH/41/1/1/0//10.8

262 20/10/2/BATH/47/1/1/0//8.5

263 21/M///CBLQTX///CBLQTX

264 22/3/1/NO/82/1//191

265 22/4/1/YES///191

266 22/5/1/YES///125

267 22/8/1/NO/66/1//191

268 22/9/1/YES///191

269 22/10/1/YES///125

270 24/1/1/19/9.75//126/20

271 24/1/2/13/9.75//126/110

272 24/2/1/14/9.75//126/110

273 24/3/1/19/9.8//126/20

274 24/3/2/14.7/9.8//126/110

275 24/4/1/13.7/9.8//126/110

276 24/4/2/8.7/9.8//126/200

277 24/5/1/14.7/7.5//126/20

278 24/5/2/13.7/7.5//126/110

279 24/5/3/3/7.5//126/290

280 24/6/1/14/9.75//126/110

281 24/6/2/9.3/9.75//126/200

282 24/7/1/4.3/9.75//126/110

283 24/7/2/4.3/9.75//126/200

284 24/8/1/11/9.8//126/110

285 24/8/2/4.3/9.8//126/200

286 24/9/1/5.3/9.8//126/200

287 24/10/1/5/7.5//126/110

288 25/1/1/5.5/2/2/.55/.57

289 25/1/2/5.5/2/1/.55/.57

290 25/2/1/8/6/1/.55/.57

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LINE #	-----
291	25/3/1/5.5/2.25/3/.55/.57
292	25/3/2/5.5/2/1/.81/.64
293	25/4/1/5.5/2.25/1/.55/.57
294	25/4/2/5.5/2.25/1/.55/.57
295	25/5/1/3.5/1.25/2/.81/.64
296	25/6/1/4/2.25/1/.55/.57
297	25/6/2/4/2.25/1/.55/.57
298	25/7/2/5.5/1.75/1/.55/.57
299	25/8/1/5.5/2.25/1/.55/.57
300	25/8/2/5.5/1.75/1/.55/.57
301	25/9/1/5.5/1.5/1/.55/.57
302	25/10/1/3/1.25/1/.81/.64
303	26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
304	27/M/374/SF-PERS/230/190/.5/WATT-SF/INCAND
305	29/1////////.22/CFM-SF/.22/CFM-SF
306	29/2////////.22/CFM-SF/.22/CFM-SF
307	29/3////////.22/CFM-SF/.22/CFM-SF
308	29/4////////.22/CFM-SF/.22/CFM-SF
309	29/5////////.22/CFM-SF/.22/CFM-SF
310	29/6////////.22/CFM-SF
311	29/7////////.22/CFM-SF
312	29/8////////.22/CFM-SF
313	29/9////////.22/CFM-SF
314	29/10////////.22/CFM-SF
315	SYSTEM - 4
316	39/4/COMBINED ECOS
317	40/1/PTAC
318	41/1/1/1
319	42/1/.2
320	45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
321	40/2/RAD
322	41/2/1/2
323	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
324	EQUIPMENT - 4
325	59/4/CARLISLE///COMBINED ECOS
326	60/1/1/PKPLANT/1/1
327	62/1/EQ1161/8
328	65/1/1//2/2
329	67/1/EQ2102/1
330	69/1/EQ4003

*Building 318*  
*Trace Output File*

933702

```
*****  
*****  
**  
**          T R A C E    6 0 0    A N A L Y S I S          **  
**  
**          by          **  
**  
*****  
*****
```

ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 318

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:52:36 1/20/94  
Dataset Name: CB318 .TM

AIRFLOW - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	PTAC	0	1,501	1,501	1,895	395	0	0
2	RAD	0	0	0	0	571	0	0
Totals		0	1,501	1,501	1,895	966	0	0

CAPACITY - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	3.4	0.0	0.0	3.4	-57,343	0	0	0	0	0	-57,343
2	RAD	0.0	0.0	0.0	0.0	-80,370	0	0	0	0	0	-80,370
Totals		3.4	0.0	0.0	3.4	-137,714	0	0	0	0	0	-137,714

The building peaked at hour 13 month 7 with a capacity of 3.3 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
BASE BUILDING

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.42	441.5	310.4	38.66	1.42	-54.35	1,055
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-53.69	1,497



System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/13 \* Mo/Hr: 7/13 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 89/ 74/105.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	4,708	171		4,878	11.96	*	4,773	15.21	*	-3,843	-4,055	7.19
Glass Solar	7,164	0		7,164	17.57	*	7,115	22.67	*	0	0	0.00
Glass Cond	1,004	0		1,004	2.46	*	1,017	3.24	*	-6,206	-6,206	11.00
Wall Cond	10,560	610		11,170	27.39	*	10,443	33.27	*	-17,668	-18,650	33.06
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	15,146			15,146	37.14	*	6,010	19.15	*	-27,497	-27,497	48.75
Sub Total==>	38,583	781		39,364	96.51	*	29,358	93.53	*	-55,213	-56,408	100.00
Internal Loads												
Lights	494	0		494	1.21	*	625	1.99	*	0	0	0.00
People	715			715	1.75	*	407	1.30	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	1,210	0	0	1,210	2.97	*	1,032	3.29	*	0	0	0.00
Ceiling Load	547	-547		0	0.00	*	1,000	3.18	*	-942	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				213	0.52	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	40,339	234	0	40,787	100.00	*	31,390	100.00	*	-56,155	-56,408	100.00

-----COOLING COIL SELECTION-----

-----AREAS-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	3.4	40.8	31.3	1,501 75.8 63.1 68.5	55.7 53.9 60.8	Part	1,055	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Roof	426	0 0
Totals	3.4	40.8				Wall	1,234	163 13

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA		Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent							
Main Htg	-57.3	1,501	67.3	102.4	Infil	395	395	Clg Cfm/Sqft	1.42	SADB	55.8	102.4
Aux Htg	0.0	0	0.0	0.0	Supply	1,501	1,501	Clg Cfm/Ton	441.48	Plenum	76.4	66.3
Preheat	-0.0	1,501	67.1	55.6	Mincfm	0	0	Clg Sqft/Ton	310.39	Return	75.7	67.1
Reheat	0.0	0	0.0	0.0	Return	1,501	1,501	Clg Btuh/Sqft	38.66	Ret/OA	75.7	67.1
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	3	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-57.3				Auxil	0	0	Htg Cfm/Sqft	1.42	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-54.35	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-4,681	-5,047	6.28
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,492	-8,492	10.57
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,592	-27,068	33.68
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-39,763	-39,763	49.48
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-78,528	-80,370	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,672	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-84,199	-80,370	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf) (%)	
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	Part	ExFlr
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	1,497	0	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0	0	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	580	0	0
Totals	0.0	0.0								1,784	224	13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	AIRFLOWS (cfm)		--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-80.4	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	63.1
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-80.4				Auxil	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-53.69	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	16.7	6.11
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	10.2	4.63
3	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.609	0.625	0.272	0.549	20.0	7.04
4	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	31.1	9.93
5	STUDY	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	23.5	8.23
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	16.7	6.11
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	10.2	4.63
3	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.609	0.625	0.272	0.549	20.0	7.04
4	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	31.1	9.93
5	STUDY	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	23.5	8.23
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	17.6	6.32
7	LAUNDRY	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	38.4	11.11
8	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.549	17.7	6.56
9	BATH	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	25.2	8.59
10	BATH	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	20.9	7.62
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.103	0.566	0.579	0.272	0.549	19.7	6.99
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.137	0.577	0.591	0.272	0.549	19.4	6.94
Building		0.000	0.000	0.000	0.000	0.142	0.579	0.593	0.272	0.549	19.3	6.93

BUILDING AREAS - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	LIVING ROOM	1	1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
System	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
1	LIVING ROOM	1	1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
6	KITCHEN	1	1	175	175	0	0	0	0	0	18	8	209
7	LAUNDRY	1	1	22	22	0	0	0	0	0	10	11	74
8	BEDROOM	1	1	157	157	0	0	0	0	66	22	15	128
9	BATH	1	1	41	41	0	0	0	0	41	8	16	44
10	BATH	1	1	47	47	0	0	0	0	47	4	10	34
Zone	2 Total/Ave.				442	0	0	0	0	154	62	11	489
System	2 Total/Ave.				1,497	0	0	0	0	580	224	13	1,560
Building					2,552	0	0	0	0	1,006	387	13	2,631

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
BASE BUILDING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value     =   0.142 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value     =   0.312 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value =   0.269 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) =   10.87 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) =   21.36 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.2	8	103	-6,886	12	584	75.0	0	0	0.0	0	0
5 - 10	0.3	9	120	-13,771	12	575	150.1	0	0	0.0	0	0
10 - 15	0.5	8	101	-20,657	17	792	225.1	0	0	0.0	0	0
15 - 20	0.7	5	69	-27,543	18	859	300.1	42	1,530	0.0	0	0
20 - 25	0.8	7	84	-34,428	20	928	375.1	0	0	0.0	0	0
25 - 30	1.0	18	225	-41,314	11	544	450.2	0	0	0.0	0	0
30 - 35	1.2	9	112	-48,200	10	457	525.2	0	0	0.0	0	0
35 - 40	1.4	12	150	-55,086	0	0	600.2	0	0	0.0	0	0
40 - 45	1.5	11	140	-61,971	0	0	675.2	0	0	0.0	0	0
45 - 50	1.7	4	50	-68,857	0	0	750.3	21	765	0.0	0	0
50 - 55	1.9	4	51	-75,743	0	0	825.3	0	0	0.0	0	0
55 - 60	2.0	0	0	-82,628	0	0	900.3	0	0	0.0	0	0
60 - 65	2.2	0	0	-89,514	0	0	975.4	0	0	0.0	0	0
65 - 70	2.4	0	0	-96,400	0	0	1,050.4	0	0	0.0	0	0
70 - 75	2.5	0	0	-103,285	0	0	1,125.4	0	0	0.0	0	0
75 - 80	2.7	0	0	-110,171	0	0	1,200.4	0	0	0.0	0	0
80 - 85	2.9	2	31	-117,057	0	0	1,275.5	0	0	0.0	0	0
85 - 90	3.1	0	0	-123,942	0	0	1,350.5	0	0	0.0	0	0
90 - 95	3.2	0	0	-130,828	0	0	1,425.5	0	0	0.0	0	0
95 - 100	3.4	2	31	-137,714	0	0	1,500.6	38	1,377	0.0	0	0
Hours Off	0.0	0	7,493	0	0	4,021	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
 BASE BUILDING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature Range (F)	----- Zone Number -----		
	1	1	2

Max. Temp.	86.0	104.1	105.9
Mo./Hr.	7 14	7 19	7 20
Day Type	1	1	1

	..... Number of Hours .....		
Above 100	0	0	154
95 - 100	0	465	706
90 - 95	0	1,092	1,234
85 - 90	0	923	992
80 - 85	62	913	472
75 - 80	2,380	279	114
70 - 75	864	0	318
65 - 70	383	5,088	4,770
60 - 65	778	0	0
55 - 60	715	0	0
50 - 55	757	0	0
Below 50	2,821	0	0

Min. Temp.	30.3	67.9	67.9
Mo./Hr.	2 9	3 19	1 9
Day Type	4	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On-Peak (Therm)	On Peak (Thrm/hr)
Jan	339	1	253	0
Feb	306	1	249	0
March	347	1	163	0
April	326	1	70	0
May	478	6	0	0
June	906	7	0	0
July	1,339	7	0	0
Aug	912	7	0	0
Sept	449	6	0	0
Oct	343	1	55	0
Nov	327	1	115	0
Dec	335	1	213	0
Total	6,407	7	1,118	0

Building Energy Consumption = 52,394 (Btu/Sq Ft/Year)  
Source Energy Consumption = 84,143 (Btu/Sq Ft/Year)

Floor Area = 2,552 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

[illegible]



Trane Air Conditioning Economics  
By: Trane Customer Direct Service Network

V 600  
PAGE 11

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
BASE BUILDING

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        6.8    (kW)  
Yearly Time of Peak 16 (hr)    7 (mo)

Hour 16    Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.4	79.47
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Sub Total			5.4	79.47
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.88
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Sub Total			0.1	1.88
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Sub Total			0.0	0.00
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Miscellaneous

Lights			1.3	18.65
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			1.3	18.65

Grand Total			6.8	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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**          by          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 318

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 14: 3:59 1/20/94  
Dataset Name: CB318 .TM

AIRFLOW - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	PTAC	0	826	826	1,172	345	0	0
2	RAD	0	0	0	0	500	0	0
Totals		0	826	826	1,172	845	0	0

CAPACITY - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling					Heating					
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	2.1	0.0	0.0	2.1	-34,308	0	0	0	0	0	-34,308
2	RAD	0.0	0.0	0.0	0.0	-48,752	0	0	0	0	0	-48,752
Totals		2.1	0.0	0.0	2.1	-83,060	0	0	0	0	0	-83,060

The building peaked at hour 14 month 7 with a capacity of 2.0 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	0.78	395.8	505.4	23.75	0.78	-32.52	1,055
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-32.57	1,497

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	678	100		778	3.11	*	738	4.20	*	-672	-811	2.38
Glass Solar	6,969	0		6,969	27.82	*	6,595	37.54	*	0	0	0.00
Glass Cond	1,080	0		1,080	4.31	*	1,135	6.46	*	-6,206	-6,206	18.21
Wall Cond	1,678	96		1,774	7.08	*	1,573	8.95	*	-2,849	-3,010	8.83
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	13,134			13,134	52.43	*	5,552	31.60	*	-24,060	-24,060	70.58
Sub Total==>	23,539	197		23,736	94.75	*	15,594	88.76	*	-33,786	-34,086	100.00
Internal Loads												
Lights	486	0		486	1.94	*	1,192	6.79	*	0	0	0.00
People	712			712	2.84	*	484	2.76	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	1,198	0	0	1,198	4.78	*	1,677	9.54	*	0	0	0.00
Ceiling Load	160	-160		0	0.00	*	299	1.70	*	-292	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				118	0.47	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	24,897	37	0	25,051	100.00	*	17,570	100.00	*	-34,078	-34,086	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	2.1	25.1	17.1	75.3 63.8 72.3	55.4 53.5 59.8	1,055		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	2.1	25.1				1,234	163	13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	0.78	SADB	55.5	105.9
Main Htg	-34.3	826	67.7	105.9	Infil	345	345	Clg Cfm/Ton	395.78	Plenum	75.4	67.4
Aux Htg	0.0	0	0.0	0.0	Supply	826	826	Clg Sqft/Ton	505.36	Return	75.2	67.7
Preheat	-0.0	826	67.7	55.3	Minclm	0	0	Clg Btuh/Sqft	23.75	Ret/OA	75.2	67.7
Reheat	0.0	0	0.0	0.0	Return	826	826	No. People	3	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.78	Fn BldTD	0.0	0.0
Total	-34.3				Auxil	0	0	Htg Btuh/Sqft	-32.52	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-840	-1,086	2.23
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,492	-8,492	17.42
Wall Cond	0	0		0	0.00	*	0	0.00	*	-4,127	-4,381	8.99
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-34,793	-34,793	71.37
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-48,251	-48,752	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-1,305	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-49,556	-48,752	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	1,497	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0	
Totals	0.0	0.0				580	0 0
						1,784	224 13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling cfm	Heating cfm	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-48.8	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	500	Clg Cfm/Ton	0.00	Plenum	0.0	66.7
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-48.8				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-32.57	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceill.		
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	17.8	6.33
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	10.6	4.71
3	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.609	0.625	0.044	0.549	21.3	7.31
4	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	33.4	10.40
5	STUDY	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	25.9	8.69
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	17.8	6.33
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	10.6	4.71
3	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.609	0.625	0.044	0.549	21.3	7.31
4	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	33.4	10.40
5	STUDY	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	25.9	8.69
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	18.8	6.56
7	LAUNDRY	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	41.8	11.78
8	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.549	18.8	6.78
9	BATH	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	26.9	8.93
10	BATH	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	22.9	8.03
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.028	0.566	0.579	0.044	0.549	21.1	7.28
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.029	0.577	0.591	0.044	0.549	20.8	7.22
Building		0.000	0.000	0.000	0.000	0.030	0.579	0.593	0.044	0.549	20.7	7.21

BUILDING AREAS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	LIVING ROOM	1	1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
System	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
1	LIVING ROOM	1	1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
6	KITCHEN	1	1	175	175	0	0	0	0	0	18	8	209
7	LAUNDRY	1	1	22	22	0	0	0	0	0	10	11	74
8	BEDROOM	1	1	157	157	0	0	0	0	66	22	15	128
9	BATH	1	1	41	41	0	0	0	0	41	8	16	44
10	BATH	1	1	47	47	0	0	0	0	47	4	10	34
Zone	2 Total/Ave.				442	0	0	0	0	154	62	11	489
System	2 Total/Ave.				1,497	0	0	0	0	580	224	13	1,560
Building					2,552	0	0	0	0	1,006	387	13	2,631

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.030 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.113 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.092 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.51 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 12.40 (Btu/Hr/Sq Ft)



SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.1	5	50	-4,153	13	617	41.3	0	0	0.0	0	0
5 - 10	0.2	8	84	-8,306	13	598	82.6	0	0	0.0	0	0
10 - 15	0.3	5	50	-12,459	19	895	123.9	0	0	0.0	0	0
15 - 20	0.4	4	43	-16,612	22	1,006	165.2	42	1,530	0.0	0	0
20 - 25	0.5	13	136	-20,765	16	724	206.6	0	0	0.0	0	0
25 - 30	0.6	12	125	-24,918	12	577	247.9	0	0	0.0	0	0
30 - 35	0.7	15	156	-29,071	5	210	289.2	0	0	0.0	0	0
35 - 40	0.8	8	86	-33,224	0	0	330.5	0	0	0.0	0	0
40 - 45	0.9	12	128	-37,377	0	0	371.8	0	0	0.0	0	0
45 - 50	1.0	8	85	-41,530	0	0	413.1	21	765	0.0	0	0
50 - 55	1.1	2	20	-45,683	0	0	454.4	0	0	0.0	0	0
55 - 60	1.3	0	0	-49,836	0	0	495.7	0	0	0.0	0	0
60 - 65	1.4	0	0	-53,989	0	0	537.1	0	0	0.0	0	0
65 - 70	1.5	0	0	-58,142	0	0	578.4	0	0	0.0	0	0
70 - 75	1.6	0	0	-62,295	0	0	619.7	0	0	0.0	0	0
75 - 80	1.7	0	0	-66,448	0	0	661.0	0	0	0.0	0	0
80 - 85	1.8	2	20	-70,601	0	0	702.3	0	0	0.0	0	0
85 - 90	1.9	1	11	-74,754	0	0	743.6	0	0	0.0	0	0
90 - 95	2.0	0	0	-78,907	0	0	784.9	0	0	0.0	0	0
95 - 100	2.1	3	31	-83,060	0	0	826.2	38	1,377	0.0	0	0
Hours Off	0.0	0	7,735	0	0	4,133	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
 WALL & ROOF INSULATION

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----		
Range	1	1	2
(F)			

Max. Temp.	83.0	108.1	112.4
Mo./Hr.	7 14	8 20	8 21
Day Type	1	1	1

	..... Number of Hours .....		
Above 100	0	1,584	2,508
95 - 100	0	1,043	420
90 - 95	0	339	151
85 - 90	0	420	341
80 - 85	0	286	252
75 - 80	2,875	0	17
70 - 75	797	17	324
65 - 70	85	5,071	4,747
60 - 65	859	0	0
55 - 60	747	0	0
50 - 55	670	0	0
Below 50	2,727	0	0

Min. Temp.	33.1	67.9	67.9
Mo./Hr.	2 9	2 7	1 16
Day Type	4	2	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On-Peak (Therm)	On Peak (Thrm/hr)
Jan	338	1	143	0
Feb	306	1	146	0
March	347	1	94	0
April	326	1	38	0
May	371	4	0	0
June	672	5	0	0
July	989	5	0	0
Aug	701	5	0	0
Sept	354	4	0	0
Oct	342	1	19	0
Nov	326	1	60	0
Dec	334	1	116	0
Total	5,407	5	615	0

Building Energy Consumption = 31,322 (8tu/Sq Ft/Year)  
Source Energy Consumption = 53,818 (8tu/Sq Ft/Year)

Floor Area = 2,552 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        4.8    (kW)  
Yearly Time of Peak 16 (hr)    7 (mo)

Hour 16    Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	3.5	71.95
Sub Total			3.5	71.95
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.47
Sub Total			0.1	1.47
Sub Total			0.0	0.00

Miscellaneous

Lights	1.3	26.58
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	1.3	26.58
Grand Total	4.8	100.00

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**          T R A C E    6 0 0    A N A L Y S I S          **  
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**          by          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 318

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 14:16: 6 1/20/94  
Dataset Name: C8318 .TM

AIRFLOW - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil. Supply	Room Exhaust
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Airflow (Cfm)	Airflow (Cfm)
1	PTAC	0	1,462	1,462	1,795	333	0	0
2	RAD	0	0	0	0	482	0	0
Totals		0	1,462	1,462	1,795	815	0	0

CAPACITY - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

		----- Cooling -----				----- Heating -----						
System Number	System Type	Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
		Capacity (Tons)	Capacity (Tons)	Capacity (Tons)	Totals (Tons)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Totals (Btuh)
1	PTAC	3.2	0.0	0.0	3.2	-52,992	0	0	0	0	0	-52,992
2	RAD	0.0	0.0	0.0	0.0	-74,157	0	0	0	0	0	-74,157
Totals		3.2	0.0	0.0	3.2	-127,149	0	0	0	0	0	-127,149

The building peaked at hour 13 month 7 with a capacity of 3.2 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	----- Cooling -----				----- Heating -----		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.39	450.0	324.7	36.96	1.39	-50.23	1,055
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-49.54	1,497



System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/13 \* Mo/Hr: 7/13 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 89/ 74/105.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	4,708	170	0	4,878	12.51	*	4,773	15.61	*	-3,843	-4,055	7.78
Glass Solar	7,164	0	0	7,164	18.37	*	7,391	24.17	*	0	0	0.00
Glass Cond	1,004	0	0	1,004	2.58	*	917	3.00	*	-6,206	-6,206	11.91
Wall Cond	10,560	610	0	11,170	28.64	*	10,730	35.09	*	-17,668	-18,649	35.79
Partition	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	13,360	0	0	13,360	34.26	*	4,656	15.23	*	-23,200	-23,200	44.52
Sub Total==>	36,797	780	0	37,577	96.36	*	28,467	93.09	*	-50,917	-52,110	100.00
Internal Loads												
Lights	494	0	0	494	1.27	*	634	2.07	*	0	0	0.00
People	715	0	0	715	1.83	*	410	1.34	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	1,210	0	0	1,210	3.10	*	1,044	3.41	*	0	0	0.00
Ceiling Load	561	-561	0	0	0.00	*	1,068	3.49	*	-961	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	0.53	*		0.00	*		0	0.00
Ret. Fan Heat		0	0	0	0.00	*		0.00	*		0	0.00
Duct Heat PkUp		0	0	0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	38,568	219	0	38,995	100.00	*	30,580	100.00	*	-51,878	-52,110	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor	1,055	
Main Clg	3.2	39.0	30.4	75.8 62.7 66.5	55.7 53.6 59.5	Part	0	
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	426	0 0
Totals	3.2	39.0				Wall	1,234	163 13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	1.39	SADB	55.8	100.6
Main Htg	-53.0	1,462	67.3	100.6	Infil	333	333	Clg Cfm/Ton	449.98	Plenum	76.4	66.3
Aux Htg	0.0	0	0.0	0.0	Supply	1,462	1,462	Clg Sqft/Ton	324.66	Return	75.7	67.1
Preheat	-0.0	1,462	67.1	55.7	Mincfm	0	0	Clg Btuh/Sqft	36.96	Ret/OA	75.7	67.1
Reheat	0.0	0	0.0	0.0	Return	1,462	1,462	No. People	3	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	1.39	Fn BldTD	0.0	0.0
Total	-53.0				Auxil	0	0	Htg Btuh/Sqft	-50.23	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-4,681	-5,047	6.81
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,492	-8,492	11.45
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,592	-27,068	36.50
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-33,550	-33,550	45.24
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-72,315	-74,157	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,672	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-77,986	-74,157	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			AREAS-----		
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Gross Total	Glass (sf) (%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Floor	1,497
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Totals	0.0	0.0									Roof	580 0 0
											Wall	1,784 224 13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	AIRFLOWS (cfm)-----		--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
	(Mbh)	(cfm)	Deg F	Deg F		Cooling	Heating	Clg % OA		Type	Clg	Htg
Main Htg	-74.2	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	63.1
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-74.2				Auxil	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-49.54	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G U - V A L U E S -----												
Room Number	Description	----- Room U-Values ----- (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (8tu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	16.7	6.11
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	10.2	4.63
3	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.609	0.625	0.272	0.549	20.0	7.04
4	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	31.1	9.93
5	STUDY	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	23.5	8.23
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	16.7	6.11
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	10.2	4.63
3	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.609	0.625	0.272	0.549	20.0	7.04
4	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	31.1	9.93
5	STUDY	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	23.5	8.23
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.149	0.582	0.596	0.272	0.549	19.2	6.91
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	17.6	6.32
7	LAUNDRY	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.549	38.4	11.11
8	BEDROOM	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.549	17.7	6.56
9	BATH	0.000	0.000	0.000	0.000	0.041	0.550	0.563	0.272	0.000	25.2	8.59
10	BATH	0.000	0.000	0.000	0.000	0.242	0.810	0.837	0.272	0.000	20.9	7.62
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.103	0.566	0.579	0.272	0.549	19.7	6.99
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.137	0.577	0.591	0.272	0.549	19.4	6.94
Building		0.000	0.000	0.000	0.000	0.142	0.579	0.593	0.272	0.549	19.3	6.93

BUILDING AREAS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	LIVING ROOM	1	1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
System	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
1	LIVING ROOM	1	1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1	1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1	1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1	1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1	1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.				1,055	0	0	0	0	426	163	13	1,071
6	KITCHEN	1	1	175	175	0	0	0	0	0	18	8	209
7	LAUNDRY	1	1	22	22	0	0	0	0	0	10	11	74
8	BEDROOM	1	1	157	157	0	0	0	0	66	22	15	128
9	BATH	1	1	41	41	0	0	0	0	41	8	16	44
10	BATH	1	1	47	47	0	0	0	0	47	4	10	34
Zone	2 Total/Ave.				442	0	0	0	0	154	62	11	489
System	2 Total/Ave.				1,497	0	0	0	0	580	224	13	1,560
Building					2,552	0	0	0	0	1,006	387	13	2,631

ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value     =   0.142 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value     =   0.312 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value =   0.269 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTvr) =   10.87 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTvw) =   21.36 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.2	7	92	-6,357	12	545	73.1	0	0	0.0	0	0
5 - 10	0.3	8	110	-12,715	13	611	146.2	0	0	0.0	0	0
10 - 15	0.5	11	145	-19,072	15	704	219.3	0	0	0.0	0	0
15 - 20	0.6	9	119	-25,430	20	921	292.4	42	1,530	0.0	0	0
20 - 25	0.8	5	62	-31,787	18	848	365.6	0	0	0.0	0	0
25 - 30	1.0	16	217	-38,145	12	552	438.7	0	0	0.0	0	0
30 - 35	1.1	9	120	-44,502	10	457	511.8	0	0	0.0	0	0
35 - 40	1.3	11	150	-50,860	0	0	584.9	0	0	0.0	0	0
40 - 45	1.5	9	118	-57,217	0	0	658.0	0	0	0.0	0	0
45 - 50	1.6	5	64	-63,575	0	0	731.1	21	765	0.0	0	0
50 - 55	1.8	2	28	-69,932	0	0	804.2	0	0	0.0	0	0
55 - 60	1.9	0	4	-76,289	0	0	877.3	0	0	0.0	0	0
60 - 65	2.1	2	27	-82,647	0	0	950.5	0	0	0.0	0	0
65 - 70	2.3	0	0	-89,004	0	0	1,023.6	0	0	0.0	0	0
70 - 75	2.4	0	0	-95,362	0	0	1,096.7	0	0	0.0	0	0
75 - 80	2.6	0	0	-101,719	0	0	1,169.8	0	0	0.0	0	0
80 - 85	2.8	0	0	-108,077	0	0	1,242.9	0	0	0.0	0	0
85 - 90	2.9	2	31	-114,434	0	0	1,316.0	0	0	0.0	0	0
90 - 95	3.1	0	0	-120,792	0	0	1,389.1	0	0	0.0	0	0
95 - 100	3.2	2	31	-127,149	0	0	1,462.2	38	1,377	0.0	0	0
Hours Off	0.0	0	7,442	0	0	4,122	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature Range (F)	1	1	2
-----------------------------	---	---	---

Max. Temp.	86.1	104.1	105.9
Mo./Hr.	7 14	7 19	7 20
Day Type	1	1	1

..... Number of Hours .....

Above 100	0	0	154
95 - 100	0	465	706
90 - 95	0	1,092	1,234
85 - 90	0	923	992
80 - 85	82	913	472
75 - 80	2,457	279	114
70 - 75	879	0	384
65 - 70	271	5,088	4,704
60 - 65	846	0	0
55 - 60	720	0	0
50 - 55	780	0	0
Below 50	2,725	0	0

Min. Temp.	30.8	67.9	67.9
Mo./Hr.	2 9	3 20	1 19
Day Type	4	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On-Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	339	1	233	0
Feb	306	1	227	0
March	347	1	147	0
April	326	1	60	0
May	498	6	0	0
June	909	6	0	0
July	1,317	7	0	0
Aug	912	6	0	0
Sept	460	6	0	0
Oct	343	1	49	0
Nov	327	1	105	0
Dec	335	1	197	0
Total	6,418	7	1,018	0

Building Energy Consumption = 48,484 (Btu/Sq Ft/Year)  
Source Energy Consumption = 78,952 (Btu/Sq Ft/Year)

Floor Area = 2,552 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	338	305	346	325	342	334	333	346	325	342	325	333	3,995
	PK	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	DIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	60	386	727	381	46	0	0	0	1,599
	PK	0.0	0.0	0.0	0.0	4.2	4.4	4.5	4.4	4.2	0.0	0.0	0.0	4.5
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	6	40	74	39	5	0	0	0	164
	PK	0.0	0.0	0.0	0.0	0.3	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.4
1	EQ5303	CONTROLS												
	ELEC	0	0	0	0	37	99	130	93	33	0	0	0	392
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4003	FC CENTRIF. FAN C.V.												
	ELEC	0	0	0	0	52	51	52	52	51	0	0	0	259
	PK	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1
1	EQ2102	PURCHASED DIST. HOT WATER												
	P HOTH2O	233	227	147	60	0	0	0	0	0	49	105	197	1,018
	PK	0.4	0.4	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.4	0.4
1	EQ5020	HEAT WATER CIRC. PUMP C.V.												



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UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value            6.6    (kW)  
Yearly Time of Peak 16 (hr)    7 (mo)

Hour 16    Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	78.81
---	--------	----------------------------	-----	-------

Sub Total			5.2	78.81
-----------	--	--	-----	-------

Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.89
---	--	------------------------------------	-----	------

Sub Total			0.1	1.89
-----------	--	--	-----	------

Sub Total			0.0	0.00
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Miscellaneous

Lights			1.3	19.30
--------	--	--	-----	-------

Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			1.3	19.30
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Grand Total			6.6	100.00
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\*\*                   T R A C E   6 0 0   A N A L Y S I S                   \*\*  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 318

Weather File Code:           CARLISLE  
Location:                   ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude:                   40.2 (deg)  
Longitude:                  77.2 (deg)  
Time Zone:                  5  
Elevation:                  475 (ft)  
Barometric Pressure:       29.2 (in. Hg)

Summer Clearness Number:   1.00  
Winter Clearness Number:   1.00  
Summer Design Dry Bulb:     92 (F)  
Summer Design Wet Bulb:     72 (F)  
Winter Design Dry Bulb:     4 (F)  
Summer Ground Relectance:   0.20  
Winter Ground Relectance:   0.20

Air Density:                0.0742 (Lbm/cuft)  
Air Specific Heat:          0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor:         4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor:            4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May        To September  
System Simulation Period: January    To December  
Cooling Load Methodology:   CLTD/CLF (Transfer Function Method)

Time/Date Program was Run:   14:27:31   1/20/94  
Dataset Name:                C8318 .TM

AIRFLOW - ALTERNATIVE 4  
COMBINED ECOS

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil. Supply	Room Exhaust
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Airflow (Cfm)	Airflow (Cfm)
1	PTAC	0	762	762	1,034	271	0	0
2	RAD	0	0	0	0	393	0	0
Totals		0	762	762	1,034	664	0	0

CAPACITY - ALTERNATIVE 4  
COMBINED ECOS

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	----- Cooling -----				----- Heating -----						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
		Capacity (Tons)	Capacity (Tons)	Capacity (Tons)	Totals (Tons)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Totals (Btuh)
1	PTAC	1.9	0.0	0.0	1.9	-29,165	0	0	0	0	0	-29,165
2	RAD	0.0	0.0	0.0	0.0	-41,296	0	0	0	0	0	-41,296
Totals		1.9	0.0	0.0	1.9	-70,461	0	0	0	0	0	-70,461

The building peaked at hour 14 month 7 with a capacity of 1.8 tons

ENGINEERING CHECKS - ALTERNATIVE 4  
COMBINED ECOS

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	----- Cooling -----				----- Heating -----		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	0.72	401.2	555.2	21.62	0.72	-27.64	1,055
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-27.59	1,497

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	678	100		778	3.41	*	738	4.51	*	-672	-810	2.80
Glass Solar	6,969	0		6,969	30.50	*	6,595	40.27	*	0	0	0.00
Glass Cond	1,080	0		1,080	4.74	*	1,135	6.93	*	-6,206	-6,206	21.45
Wall Cond	1,678	96		1,774	7.78	*	1,573	9.60	*	-2,849	-3,010	10.41
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	10,896			10,896	47.78	*	4,363	26.64	*	-18,904	-18,904	65.34
Sub Total==>	21,301	197		21,498	94.27	*	14,404	87.95	*	-28,631	-28,931	100.00
Internal Loads												
Lights	486	0		486	2.13	*	1,192	7.28	*	0	0	0.00
People	712			712	3.12	*	484	2.96	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	1,198	0	0	1,198	5.25	*	1,677	10.24	*	0	0	0.00
Ceiling Load	168	-168		0	0.00	*	297	1.81	*	-308	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				108	0.48	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	22,667	28	0	22,804	100.00	*	16,377	100.00	*	-28,939	-28,931	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	1.9	22.8	762	75.3 63.5 71.0	55.2 53.4 59.4	Part	1,055	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	426	0 0
Totals	1.9	22.8				Wall	1,234	163 13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	0.72	SADB	55.3	102.9
Main Htg	-29.2	762	67.7	102.9	Infil	271	271	Clg Cfm/Ton	401.16	Plenum	75.4	67.4
Aux Htg	0.0	0	0.0	0.0	Supply	762	762	Clg Sqft/Ton	555.17	Return	75.3	67.6
Preheat	-0.0	762	67.6	55.1	Mincfm	0	0	Clg Btuh/Sqft	21.62	Ret/OA	75.3	67.6
Reheat	0.0	0	0.0	0.0	Return	762	762	No. People	3	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.72	Fn BldTD	0.0	0.0
Total	-29.2				Auxil	0	0	Htg Btuh/Sqft	-27.64	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-840	-1,086	2.63
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,492	-8,492	20.56
Wall Cond	0	0		0	0.00	*	0	0.00	*	-4,127	-4,381	10.61
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-27,337	-27,337	66.20
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-40,796	-41,296	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-1,305	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-42,101	-41,296	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Floor	1,497	
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	0.0	0.0				Roof	580	0 0
						Wall	1,784	224 13

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-41.3	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	393	Clg Cfm/Ton	0.00	Plenum	0.0	66.7
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-41.3				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-27.59	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 4  
COMBINED ECOS

----- B U I L D I N G U - V A L U E S -----

		Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
Room Number	Description	Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	17.8	6.33
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	10.6	4.71
3	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.609	0.625	0.044	0.549	21.3	7.31
4	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	33.4	10.40
5	STUDY	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	25.9	8.69
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20
1	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	17.8	6.33
2	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	10.6	4.71
3	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.609	0.625	0.044	0.549	21.3	7.31
4	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	33.4	10.40
5	STUDY	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	25.9	8.69
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.030	0.582	0.596	0.044	0.549	20.7	7.20
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	18.8	6.56
7	LAUNDRY	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.549	41.8	11.78
8	BEDROOM	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.549	18.8	6.78
9	BATH	0.000	0.000	0.000	0.000	0.027	0.550	0.563	0.044	0.000	26.9	8.93
10	BATH	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.044	0.000	22.9	8.03
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.028	0.566	0.579	0.044	0.549	21.1	7.28
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.029	0.577	0.591	0.044	0.549	20.8	7.22
Building		0.000	0.000	0.000	0.000	0.030	0.579	0.593	0.044	0.549	20.7	7.21

BUILDING AREAS - ALTERNATIVE 4  
COMBINED ECOS

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	LIVING ROOM	1 1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1 1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1 1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1 1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1 1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
System	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
1	LIVING ROOM	1 1	254	254	0	0	0	0	0	33	11	279
2	DINING ROOM	1 1	209	209	0	0	0	0	0	48	35	89
3	BEDROOM	1 1	248	248	0	0	0	0	82	48	15	282
4	BEDROOM	1 1	116	116	0	0	0	0	116	25	11	195
5	STUDY	1 1	228	228	0	0	0	0	228	9	4	227
Zone	1 Total/Ave.			1,055	0	0	0	0	426	163	13	1,071
6	KITCHEN	1 1	175	175	0	0	0	0	0	18	8	209
7	LAUNDRY	1 1	22	22	0	0	0	0	0	10	11	74
8	BEDROOM	1 1	157	157	0	0	0	0	66	22	15	128
9	BATH	1 1	41	41	0	0	0	0	41	8	16	44
10	BATH	1 1	47	47	0	0	0	0	47	4	10	34
Zone	2 Total/Ave.			442	0	0	0	0	154	62	11	489
System	2 Total/Ave.			1,497	0	0	0	0	580	224	13	1,560
Building				2,552	0	0	0	0	1,006	387	13	2,631

ASHRAE 90 ANALYSIS - ALTERNATIVE 4  
COMBINED ECOS

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.030 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.113 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.092 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTvr) = 1.51 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTvw) = 12.40 (Btu/Hr/Sq Ft)



SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4  
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.1	7	83	-3,523	13	550	38.1	0	0	0.0	0	0
5 - 10	0.2	12	144	-7,046	14	598	76.2	0	0	0.0	0	0
10 - 15	0.3	6	72	-10,569	19	822	114.4	0	0	0.0	0	0
15 - 20	0.4	4	47	-14,092	21	922	152.5	42	1,530	0.0	0	0
20 - 25	0.5	16	194	-17,615	17	733	190.6	0	0	0.0	0	0
25 - 30	0.6	13	166	-21,138	12	528	228.7	0	0	0.0	0	0
30 - 35	0.7	8	104	-24,661	5	212	266.8	0	0	0.0	0	0
35 - 40	0.8	7	93	-28,184	0	0	304.9	0	0	0.0	0	0
40 - 45	0.9	10	128	-31,708	0	0	343.1	0	0	0.0	0	0
45 - 50	1.0	7	87	-35,231	0	0	381.2	21	765	0.0	0	0
50 - 55	1.0	2	20	-38,754	0	0	419.3	0	0	0.0	0	0
55 - 60	1.1	4	51	-42,277	0	0	457.4	0	0	0.0	0	0
60 - 65	1.2	0	0	-45,800	0	0	495.5	0	0	0.0	0	0
65 - 70	1.3	0	0	-49,323	0	0	533.6	0	0	0.0	0	0
70 - 75	1.4	0	0	-52,846	0	0	571.8	0	0	0.0	0	0
75 - 80	1.5	0	0	-56,369	0	0	609.9	0	0	0.0	0	0
80 - 85	1.6	0	0	-59,892	0	0	648.0	0	0	0.0	0	0
85 - 90	1.7	0	0	-63,415	0	0	686.1	0	0	0.0	0	0
90 - 95	1.8	0	0	-66,938	0	0	724.2	0	0	0.0	0	0
95 - 100	1.9	5	62	-70,461	0	0	762.3	38	1,377	0.0	0	0
Hours Off	0.0	0	7,509	0	0	4,395	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4  
 COMBINED ECOS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----		
Range	1	1	2
(F)			
Max. Temp.	83.0	108.1	112.4
Mo./Hr.	7 14	8 20	8 21
Day Type	1	1	1
	..... Number of Hours .....		
Above 100	0	1,584	2,508
95 - 100	0	1,043	420
90 - 95	0	339	151
85 - 90	0	420	341
80 - 85	31	286	252
75 - 80	3,000	0	68
70 - 75	641	68	494
65 - 70	297	5,020	4,526
60 - 65	895	0	0
55 - 60	653	0	0
50 - 55	671	0	0
Below 50	2,572	0	0
Min. Temp.	34.4	67.9	67.9
Mo./Hr.	2 9	3 20	1 19
Day Type	4	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4  
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	338	1	118	0
Feb	306	1	120	0
March	347	1	75	0
April	326	1	26	0
May	401	4	0	0
June	706	4	0	0
July	989	5	0	0
Aug	721	4	0	0
Sept	382	4	0	0
Oct	342	1	11	0
Nov	326	1	47	0
Dec	334	1	96	0
Total	5,518	5	492	0

Building Energy Consumption = 26,664 (Btu/Sq Ft/Year)  
Source Energy Consumption = 47,853 (Btu/Sq Ft/Year)

Floor Area = 2,552 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS ELEC PK	338 1.3	305 1.3	346 1.3	325 1.3	342 1.3	334 1.3	333 1.3	346 1.3	325 1.3	342 1.3	325 1.3	333 1.3	3,995 1.3
1	MISC LD ELEC PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
2	MISC LD GAS PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
3	MISC LD OIL PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
4	MISC LD P STEAM PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
5	MISC LD P HOTH2O PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
6	MISC LD P CHILL PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
1	EQ1161 ELEC PK	AIR-CLD COND COMP <15 TONS												
		0	0	0	0	11	224	438	231	11	0	0	0	915
		0.0	0.0	0.0	0.0	2.3	2.5	2.6	2.6	2.5	0.0	0.0	0.0	2.6
1	EQ5200 ELEC PK	CONDENSER FANS												
		0	0	0	0	1	23	44	24	1	0	0	0	94
		0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.2	0.2	0.0	0.0	0.0	0.3
1	EQ5303 ELEC PK	CONTROLS												
		0	0	0	0	20	99	146	93	18	0	0	0	375
		0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4003 ELEC PK	FC CENTRIF. FAN C.V.												
		0	0	0	0	27	26	27	27	26	0	0	0	135
		0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.1
1	EQ2102 P HOTH2O PK	PURCHASED DIST. HOT WATER												
		118	120	75	26	0	0	0	0	0	11	47	96	492
		0.2	0.2	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2
1	EQ5020	HEAT WATER CIRC. PUMP C.V.												

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 4  
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 4.5 (kW)  
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	3.2	70.28
---	--------	----------------------------	-----	-------

Sub Total			3.2	70.28
-----------	--	--	-----	-------

Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.45
---	--	------------------------------------	-----	------

Sub Total			0.1	1.45
-----------	--	--	-----	------

Sub Total			0.0	0.00
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Miscellaneous

Lights			1.3	28.28
--------	--	--	-----	-------

Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			1.3	28.28
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Grand Total			4.5	100.00
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*Building 321*  
*Trace Input File*

933702

CONTENTS OF : E:\CB321.TM

LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 321

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/BASE BUILDING

13 20/1/1/DINING ROOM/181/1/1/.8/.39/10

14 20/2/1/LIVING ROOM/539/1/1/.8/.39/10

15 20/3/1/MASTER BEDROOM/285/1/1/.8/.39/8.5

16 20/4/1/BEDROOM/157/1/1/0//8.5

17 20/5/1/3RD FLOOR/160/1/1/0//9

18 20/6/2/KITCHEN/156/1/1/.8/.39/10

19 20/7/2/BACK PORCH/59/1/1/0//10

20 20/8/2/BATH/90/1/1/.8/.39/8.5

21 20/9/2/BEDROOM/148/1/1/0//8.5

22 20/10/2/STAIRS/170/1/1/0//17

23 20/11/2/BATH/76/1/1/0//9

24 21/M////CBLQTX//CBLQTX

25 22/4/1/YES////199

26 22/5/1/YES////200

27 22/7/1/YES////200

28 22/9/1/YES////199

29 22/10/1/NO/13/6//200

30 22/11/1/YES////200

31 24/1/1/12.5/9//167/17

32 24/1/2/14.5/9//167/107

33 24/2/1/19/9//167/17

34 24/2/2/19/9//167/197

35 24/2/3/28/9//167/287

36 24/3/1/19/8.5//167/17

37 24/3/2/17.5/8.5//167/107

38 24/4/1/14/8.5//167/287

39 24/4/2/12.5/8.5//167/17

40 24/5/1/7/7.1//167/17

41 24/6/1/13/9//167/107

42 24/7/1/5/9//167/107

43 24/7/2/11.75/9//167/197

44 24/7/3/5/9//167/287

45 24/8/1/10/8.5//167/107

46 24/8/2/9/8.5//167/197

47 24/9/1/12.5/8.5//167/197

48 24/9/2/13/8.5//167/287

49 24/10/1/6/16//167/197

50 25/1/1/5.5/3/1/.55/.57

51 25/1/2/5.5/3/1/.55/.57

52 25/2/1/5.5/3/1/.55/.57

53 25/2/2/5.5/3/1/.55/.57

54 25/2/3/5.5/3/2/.55/.57

55 25/3/1/5/3/2/.55/.57

56 25/3/2/5/3/1/.55/.57

57 25/4/1/5/3/1/.55/.57

58 25/4/2/5/3/1/.55/.57



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LINE #	
59	25/5/1/2.5/1.7/2/.55/.57
60	25/6/1/4.2/3/1/.55/.57
61	25/7/2/10.8/1/1/1.04/1
62	25/8/1/4.3/3/1/.55/.57
63	25/8/2/3.3/2.5/1/.55/.57
64	25/9/1/5/3/1/.55/.57
65	25/9/2/5/3/1/.55/.57
66	25/10/1/20/1/1/.61/.88
67	26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
68	27/M/505/SF-PERS/230/190/.5/WATT-SF/INCAND
69	29/1////////.29/CFM-SF/.29/CFM-SF
70	29/2////////.29/CFM-SF/.29/CFM-SF
71	29/3////////.29/CFM-SF/.29/CFM-SF
72	29/4////////.29/CFM-SF/.29/CFM-SF
73	29/5////////.29/CFM-SF/.29/CFM-SF
74	29/6////////.29/CFM-SF
75	29/7////////.29/CFM-SF
76	29/8////////.29/CFM-SF
77	29/9////////.29/CFM-SF
78	29/10////////.29/CFM-SF
79	29/11////////.29/CFM-SF
80	31/5/1/36/7//162/SINE-FIT/95/40
81	31/10/1/16/7//162/SINE-FIT/95/40
82	31/11/1/18/7//162/SINE-FIT/95/40
83	SYSTEM - 1
84	39/1/BASE BUILDING
85	40/1/PTAC
86	41/1/1/1
87	42/1/.2
88	45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
89	40/2/RAD
90	41/2/1/2
91	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
92	EQUIPMENT - 1
93	59/1/CARLISLE///BASE BUILDING
94	60/1/1/PKPLANT/1/1
95	62/1/EQ1161/5
96	65/1/1//2/2
97	67/1/EQ2102/1
98	69/1/EQ4003
99	LOAD - 2
100	19/2/WALL & ROOF INSULATION
101	20/1/1/DINING ROOM/181/1/1/.8/.39/10
102	20/2/1/LIVING ROOM/539/1/1/.8/.39/10
103	20/3/1/MASTER BEDROOM/285/1/1/.8/.39/8.5
104	20/4/1/BEDROOM/157/1/1/0//8.5
105	20/5/1/3RD FLOOR/160/1/1/0//9
106	20/6/2/KITCHEN/156/1/1/.8/.39/10
107	20/7/2/BACK PORCH/59/1/1/0//10
108	20/8/2/BATH/90/1/1/.8/.39/8.5
109	20/9/2/BEDROOM/148/1/1/0//8.5
110	20/10/2/STAIRS/170/1/1/0//17
111	20/11/2/BATH/76/1/1/0//9
112	21/M////CBLQTX///CBLQTX
113	22/4/1/YES////199
114	22/5/1/YES////200
115	22/7/1/YES////200
116	22/9/1/YES////199

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LINE #	
117	22/10/1/NO/13/6//200
118	22/11/1/YES////200
119	24/1/1/12.5/9//126/17
120	24/1/2/14.5/9//126/107
121	24/2/1/19/9//126/17
122	24/2/2/19/9//126/197
123	24/2/3/28/9//126/287
124	24/3/1/19/8.5//126/17
125	24/3/2/17.5/8.5//126/107
126	24/4/1/14/8.5//126/287
127	24/4/2/12.5/8.5//126/17
128	24/5/1/7/7.1//126/17
129	24/6/1/13/9//126/107
130	24/7/1/5/9//126/107
131	24/7/2/11.75/9//126/197
132	24/7/3/5/9//126/287
133	24/8/1/10/8.5//126/107
134	24/8/2/9/8.5//126/197
135	24/9/1/12.5/8.5//126/197
136	24/9/2/13/8.5//126/287
137	24/10/1/6/16//126/197
138	25/1/1/5.5/3/1/.55/.57
139	25/1/2/5.5/3/1/.55/.57
140	25/2/1/5.5/3/1/.55/.57
141	25/2/2/5.5/3/1/.55/.57
142	25/2/3/5.5/3/2/.55/.57
143	25/3/1/5/3/2/.55/.57
144	25/3/2/5/3/1/.55/.57
145	25/4/1/5/3/1/.55/.57
146	25/4/2/5/3/1/.55/.57
147	25/5/1/2.5/1.7/2/.55/.57
148	25/6/1/4.2/3/1/.55/.57
149	25/7/2/10.8/1/1/1.04/1
150	25/8/1/4.3/3/1/.55/.57
151	25/8/2/3.3/2.5/1/.55/.57
152	25/9/1/5/3/1/.55/.57
153	25/9/2/5/3/1/.55/.57
154	25/10/1/20/1/1/.61/.88
155	26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
156	27/M/505/SF-PERS/230/190/.5/WATT-SF/INCAND
157	29/1/////25/CFM-SF/.25/CFM-SF
158	29/2/////25/CFM-SF/.25/CFM-SF
159	29/3/////25/CFM-SF/.25/CFM-SF
160	29/4/////25/CFM-SF/.25/CFM-SF
161	29/5/////25/CFM-SF/.25/CFM-SF
162	29/6/////25/CFM-SF
163	29/7/////25/CFM-SF
164	29/8/////25/CFM-SF
165	29/9/////25/CFM-SF
166	29/10/////25/CFM-SF
167	29/11/////25/CFM-SF
168	31/5/1/36/7//162/SINE-FIT/95/40
169	31/10/1/16/7//162/SINE-FIT/95/40
170	31/11/1/18/7//162/SINE-FIT/95/40
171	SYSTEM - 2
172	39/2/WALL & ROOF INSULATION
173	40/1/PTAC
174	41/1/1/1

CONTENTS OF : E:\CB321.TM

LINE #	-----
175	42/1/.2
176	45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
177	40/2/RAD
178	41/2/1/2
179	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
180	EQUIPMENT - 2
181	59/2/CARLISLE///WALL & ROOF INSULATION
182	60/1/1/PKPLANT/1/1
183	62/1/EQ1161/5
184	65/1/1//2/2
185	67/1/EQ2102/1
186	69/1/EQ4003
187	LOAD - 3
188	19/3/WEATHERSTRIP & CAULKING
189	20/1/1/DINING ROOM/181/1/1/.8/.39/10
190	20/2/1/LIVING ROOM/539/1/1/.8/.39/10
191	20/3/1/MASTER BEDROOM/285/1/1/.8/.39/8.5
192	20/4/1/BEDROOM/157/1/1/0//8.5
193	20/5/1/3RD FLOOR/160/1/1/0//9
194	20/6/2/KITCHEN/156/1/1/.8/.39/10
195	20/7/2/BACK PORCH/59/1/1/0//10
196	20/8/2/BATH/90/1/1/.8/.39/8.5
197	20/9/2/BEDROOM/148/1/1/0//8.5
198	20/10/2/STAIRS/170/1/1/0//17
199	20/11/2/BATH/76/1/1/0//9
200	21/M////CBLQTX///CBLQTX
201	22/4/1/YES////199
202	22/5/1/YES////200
203	22/7/1/YES////200
204	22/9/1/YES////199
205	22/10/1/NO/13/6//200
206	22/11/1/YES////200
207	24/1/1/12.5/9//167/17
208	24/1/2/14.5/9//167/107
209	24/2/1/19/9//167/17
210	24/2/2/19/9//167/197
211	24/2/3/28/9//167/287
212	24/3/1/19/8.5//167/17
213	24/3/2/17.5/8.5//167/107
214	24/4/1/14/8.5//167/287
215	24/4/2/12.5/8.5//167/17
216	24/5/1/7/7.1//167/17
217	24/6/1/13/9//167/107
218	24/7/1/5/9//167/107
219	24/7/2/11.75/9//167/197
220	24/7/3/5/9//167/287
221	24/8/1/10/8.5//167/107
222	24/8/2/9/8.5//167/197
223	24/9/1/12.5/8.5//167/197
224	24/9/2/13/8.5//167/287
225	24/10/1/6/16//167/197
226	25/1/1/5.5/3/1/.55/.57
227	25/1/2/5.5/3/1/.55/.57
228	25/2/1/5.5/3/1/.55/.57
229	25/2/2/5.5/3/1/.55/.57
230	25/2/3/5.5/3/2/.55/.57
231	25/3/1/5/3/2/.55/.57
232	25/3/2/5/3/1/.55/.57

CONTENTS OF : E:\CB321.TM

LINE #	
233	25/4/1/5/3/1/.55/.57
234	25/4/2/5/3/1/.55/.57
235	25/5/1/2.5/1.7/2/.55/.57
236	25/6/1/4.2/3/1/.55/.57
237	25/7/2/10.8/1/1/1.04/1
238	25/8/1/4.3/3/1/.55/.57
239	25/8/2/3.3/2.5/1/.55/.57
240	25/9/1/5/3/1/.55/.57
241	25/9/2/5/3/1/.55/.57
242	25/10/1/20/1/1/.61/.88
243	26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
244	27/M/505/SF-PERS/230/190/.5/WATT-SF/INCAND
245	29/1////////.24/CFM-SF/.24/CFM-SF
246	29/2////////.24/CFM-SF/.24/CFM-SF
247	29/3////////.24/CFM-SF/.24/CFM-SF
248	29/4////////.24/CFM-SF/.24/CFM-SF
249	29/5////////.24/CFM-SF/.24/CFM-SF
250	29/6////////.24/CFM-SF
251	29/7////////.24/CFM-SF
252	29/8////////.24/CFM-SF
253	29/9////////.24/CFM-SF
254	29/10////////.24/CFM-SF
255	29/11////////.24/CFM-SF
256	31/5/1/36/7//162/SINE-FIT/95/40
257	31/10/1/16/7//162/SINE-FIT/95/40
258	31/11/1/18/7//162/SINE-FIT/95/40
259	SYSTEM - 3
260	39/3/WEATHERSTRIP & CAULKING
261	40/1/PTAC
262	41/1/1/1
263	42/1/.2
264	45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
265	40/2/RAD
266	41/2/1/2
267	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
268	EQUIPMENT - 3
269	59/3/CARLISLE//WEATHERSTRIP & CAULKING
270	60/1/1/PKPLANT/1/1
271	62/1/EQ1161/5
272	65/1/1//2/2
273	67/1/EQ2102/1
274	69/1/EQ4003
275	LOAD - 4
276	19/4/COMBINED ECOS
277	20/1/1/DINING ROOM/181/1/1/.8/.39/10
278	20/2/1/LIVING ROOM/539/1/1/.8/.39/10
279	20/3/1/MASTER BEDROOM/285/1/1/.8/.39/8.5
280	20/4/1/BEDROOM/157/1/1/0//8.5
281	20/5/1/3RD FLOOR/160/1/1/0//9
282	20/6/2/KITCHEN/156/1/1/.8/.39/10
283	20/7/2/BACK PORCH/59/1/1/0//10
284	20/8/2/BATH/90/1/1/.8/.39/8.5
285	20/9/2/BEDROOM/148/1/1/0//8.5
286	20/10/2/STAIRS/170/1/1/0//17
287	20/11/2/BATH/76/1/1/0//9
288	21/M////CBLQTX///CBLQTX
289	22/4/1/YES////199
290	22/5/1/YES////200

CONTENTS OF : E:\CB321.TM

LINE #	
291	22/7/1/YES////200
292	22/9/1/YES////199
293	22/10/1/NO/13/6//200
294	22/11/1/YES////200
295	24/1/1/12.5/9//126/17
296	24/1/2/14.5/9//126/107
297	24/2/1/19/9//126/17
298	24/2/2/19/9//126/197
299	24/2/3/28/9//126/287
300	24/3/1/19/8.5//126/17
301	24/3/2/17.5/8.5//126/107
302	24/4/1/14/8.5//126/287
303	24/4/2/12.5/8.5//126/17
304	24/5/1/7/7.1//126/17
305	24/6/1/13/9//126/107
306	24/7/1/5/9//126/107
307	24/7/2/11.75/9//126/197
308	24/7/3/5/9//126/287
309	24/8/1/10/8.5//126/107
310	24/8/2/9/8.5//126/197
311	24/9/1/12.5/8.5//126/197
312	24/9/2/13/8.5//126/287
313	24/10/1/6/16//126/197
314	25/1/1/5.5/3/1/.55/.57
315	25/1/2/5.5/3/1/.55/.57
316	25/2/1/5.5/3/1/.55/.57
317	25/2/2/5.5/3/1/.55/.57
318	25/2/3/5.5/3/2/.55/.57
319	25/3/1/5/3/2/.55/.57
320	25/3/2/5/3/1/.55/.57
321	25/4/1/5/3/1/.55/.57
322	25/4/2/5/3/1/.55/.57
323	25/5/1/2.5/1.7/2/.55/.57
324	25/6/1/4.2/3/1/.55/.57
325	25/7/2/10.8/1/1/1.04/1
326	25/8/1/4.3/3/1/.55/.57
327	25/8/2/3.3/2.5/1/.55/.57
328	25/9/1/5/3/1/.55/.57
329	25/9/2/5/3/1/.55/.57
330	25/10/1/20/1/1/.61/.88
331	26/M/CBLQP/CBLQL/OFF//OFF/CBLQCLG/OFF/OFF/OFF/OFF
332	27/M/505/SF-PERS/230/190/.5/WATT-SF/INCAND
333	29/1/////20/CFM-SF/.20/CFM-SF
334	29/2/////20/CFM-SF/.20/CFM-SF
335	29/3/////20/CFM-SF/.20/CFM-SF
336	29/4/////20/CFM-SF/.20/CFM-SF
337	29/5/////20/CFM-SF/.20/CFM-SF
338	29/6/////20/CFM-SF
339	29/7/////20/CFM-SF
340	29/8/////20/CFM-SF
341	29/9/////20/CFM-SF
342	29/10/////20/CFM-SF
343	29/11/////20/CFM-SF
344	31/5/1/36/7//162/SINE-FIT/95/40
345	31/10/1/16/7//162/SINE-FIT/95/40
346	31/11/1/18/7//162/SINE-FIT/95/40
347	SYSTEM - 4
348	39/4/COMBINED ECOS

CONTENTS OF : E:\CB321.TM

LINE # -----

349 40/1/PTAC  
 350 41/1/1/1  
 351 42/1/.2  
 352 45/1/CBLQCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF  
 353 40/2/RAD  
 354 41/2/1/2  
 355 45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF  
 356 EQUIPMENT - 4  
 357 59/4/CARLISLE///COMBINED ECOS  
 358 60/1/1/PKPLANT/1/1  
 359 62/1/EQ1161/5  
 360 65/1/1//2/2  
 361 67/1/EQ2102/1  
 362 69/1/EQ4003

*Building 321*  
*Trace Output File*

933702

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**          T R A C E   6 0 0   A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 321

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)

Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20

Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:25:10 1/24/94  
Dataset Name: CB321 .TM



AIRFLOW - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	PTAC	0	1,484	1,484	1,897	412	0	0
2	RAD	0	0	0	0	641	0	0
Totals		0	1,484	1,484	1,897	1,053	0	0

CAPACITY - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling					Heating					
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	3.4	0.0	0.0	3.4	-58,107	0	0	0	0	0	-58,107
2	RAD	0.0	0.0	0.0	0.0	-90,309	0	0	0	0	0	-90,309
Totals		3.4	0.0	0.0	3.4	-148,415	0	0	0	0	0	-148,415

The building peaked at hour 16 month 7 with a capacity of 3.3 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.12	436.5	388.8	30.86	1.12	-43.95	1,322
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-44.69	2,021

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	576	0		576	1.41	*	599	1.91	*	-568	-568	0.98
Glass Solar	6,842	0		6,842	16.77	*	7,707	24.59	*	0	0	0.00
Glass Cond	1,286	0		1,286	3.15	*	1,153	3.68	*	-6,575	-6,575	11.40
Wall Cond	12,639	1,039		13,678	33.52	*	13,690	43.69	*	-19,941	-21,587	37.42
Partition	164			164	0.40	*	164	0.52	*	-229	-229	0.40
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	15,941			15,941	39.07	*	5,832	18.61	*	-28,725	-28,725	49.80
Sub Total==>	37,448	1,039		38,487	94.33	*	29,144	93.01	*	-56,037	-57,683	100.00
Internal Loads						*			*			
Lights	1,268	0		1,268	3.11	*	1,312	4.19	*	0	0	0.00
People	835			835	2.05	*	426	1.36	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	2,103	0	0	2,103	5.16	*	1,738	5.55	*	0	0	0.00
Ceiling Load	357	-357		0	0.00	*	452	1.44	*	-577	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				211	0.52	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkub		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	39,909	682	0	40,801	100.00	*	31,334	100.00	*	-56,614	-57,683	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	3.4	40.8	1,484	75.5 62.6 66.5	55.5 53.2 58.2	1,322		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	252		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	3.4	40.8				1,422	183	13

-----AREAS-----

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	1.12	SADB	55.6	103.1
Main Htg	-58.1	1,484	67.1	103.1	Infil	412	412	Clg Cfm/Ton	436.50	Plenum	75.6	66.8
Aux Htg	0.0	0	0.0	0.0	Supply	1,484	1,484	Clg Sqft/Ton	388.81	Return	75.5	67.1
Preheat	-0.0	1,484	67.1	55.5	Mincfm	0	0	Clg Btuh/Sqft	30.86	Ret/OA	75.5	67.1
Reheat	0.0	0	0.0	0.0	Return	1,484	1,484	No. People	3	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	1.12	Fn BldTD	0.0	0.0
Total	-58.1				Auxil	0	0	Htg Btuh/Sqft	-43.95	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/0 \* Mo/Hr: 0/0 \* Mo/Hr: 13/1  
Outside Air ==> OADB/WB/HR: 0/0/0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-1,234	-1,234	1.37
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-10,422	-10,422	11.54
Wall Cond	0	0		0	0.00	*	0	0.00	*	-31,588	-33,588	37.19
Partition	0			0	0.00	*	0	0.00	*	-446	-446	0.49
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-44,620	-44,620	49.41
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-88,309	-90,309	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0			0	0.00	*	0	0.00	*	-3,111	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-91,420	-90,309	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf) (%)	
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	2,021	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	490	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	678	0 0
Totals	0.0	0.0								Wall	2,209	277 13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	AIRFLOWS (cfm)		--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-90.3	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	65.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-90.3				Auxil	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-44.69	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Windo	Wall	Ceil.		
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	17.3	6.25
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.5	5.85
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.1	5.74
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.3	10.03
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.272	0.000	36.1	11.72
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09
System	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	17.3	6.25
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.5	5.85
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.1	5.74
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.3	10.03
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.272	0.000	36.1	11.72
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	12.6	5.17
7	BACK PORCH	0.000	0.000	0.000	0.000	0.033	1.040	1.086	0.272	0.000	49.1	13.92
8	BATH	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	21.1	7.12
9	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.5	10.07
10	STAIRS	0.032	0.000	0.000	0.000	0.033	0.610	0.625	0.272	0.000	22.5	7.94
11	BATH	0.032	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	34.4	11.37
Zone	2 Total/Ave.	0.032	0.000	0.000	0.000	0.029	0.619	0.636	0.272	0.568	25.8	8.55
System	2 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.573	0.587	0.272	0.568	22.1	7.59
Building		0.032	0.000	0.000	0.000	0.028	0.564	0.578	0.272	0.568	21.3	7.39

BUILDING AREAS - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	DINING ROOM	1 1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1 1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1 1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1 1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1 1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.			1,322	252	0	0	0	317	183	13	1,240
System	1 Total/Ave.			1,322	252	0	0	0	317	183	13	1,240
1	DINING ROOM	1 1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1 1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1 1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1 1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1 1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.			1,322	252	0	0	0	317	183	13	1,240
6	KITCHEN	1 1	156	156	0	0	0	0	0	13	11	104
7	BACK PORCH	1 1	59	59	0	0	0	0	59	11	6	185
8	BATH	1 1	90	90	0	0	0	0	0	21	13	140
9	BEDROOM	1 1	148	148	0	0	0	0	148	30	14	187
10	STAIRS	1 1	170	170	112	0	0	0	78	20	21	76
11	BATH	1 1	76	76	126	0	0	0	76	0	0	0
Zone	2 Total/Ave.			699	238	0	0	0	361	95	12	692
System	2 Total/Ave.			2,021	490	0	0	0	678	277	13	1,932
Building				3,343	742	0	0	0	995	460	13	3,172

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
BASE BUILDING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.028 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.309 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.249 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.21 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 21.47 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.2	11	110	-7,421	9	443	74.2	0	0	0.0	0	0
5 - 10	0.3	6	62	-14,842	15	683	148.4	0	0	0.0	0	0
10 - 15	0.5	5	52	-22,262	13	625	222.6	0	0	0.0	0	0
15 - 20	0.7	11	115	-29,683	18	832	296.8	42	1,530	0.0	0	0
20 - 25	0.9	4	46	-37,104	18	844	371.0	0	0	0.0	0	0
25 - 30	1.0	7	76	-44,525	13	616	445.2	0	0	0.0	0	0
30 - 35	1.2	14	140	-51,945	12	552	519.4	0	0	0.0	0	0
35 - 40	1.4	4	42	-59,366	2	94	593.7	0	0	0.0	0	0
40 - 45	1.5	10	104	-66,787	0	0	667.9	0	0	0.0	0	0
45 - 50	1.7	13	132	-74,208	0	0	742.1	21	765	0.0	0	0
50 - 55	1.9	4	42	-81,628	0	0	816.3	0	0	0.0	0	0
55 - 60	2.0	5	51	-89,049	0	0	890.5	0	0	0.0	0	0
60 - 65	2.2	2	20	-96,470	0	0	964.7	0	0	0.0	0	0
65 - 70	2.4	0	0	-103,891	0	0	1,038.9	0	0	0.0	0	0
70 - 75	2.6	0	0	-111,312	0	0	1,113.1	0	0	0.0	0	0
75 - 80	2.7	0	0	-118,732	0	0	1,187.3	0	0	0.0	0	0
80 - 85	2.9	0	0	-126,153	0	0	1,261.5	0	0	0.0	0	0
85 - 90	3.1	0	0	-133,574	0	0	1,335.7	0	0	0.0	0	0
90 - 95	3.2	2	20	-140,995	0	0	1,409.9	0	0	0.0	0	0
95 - 100	3.4	1	11	-148,415	0	0	1,484.1	38	1,377	0.0	0	0
Hours Off	0.0	0	7,737	0	0	4,071	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature	----- Zone Number -----		
Range (F)	1	1	2
Max. Temp.	82.4	100.5	103.6
Mo./Hr.	7 14	7 21	8 20
Day Type	1	1	1
..... Number of Hours .....			
Above 100	0	0	79
95 - 100	0	249	748
90 - 95	0	928	1,340
85 - 90	0	935	882
80 - 85	0	1,066	553
75 - 80	2,401	486	70
70 - 75	974	8	437
65 - 70	314	5,088	4,651
60 - 65	627	0	0
55 - 60	769	0	0
50 - 55	757	0	0
Below 50	2,918	0	0
Min. Temp.	30.9	67.9	67.9
Mo./Hr.	2 9	3 20	1 20
Day Type	4	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	444	2	288	1
Feb	401	2	283	1
March	455	2	187	0
April	427	2	81	0
May	536	7	0	0
June	950	7	0	0
July	1,417	7	0	0
Aug	935	7	0	0
Sept	478	7	0	0
Oct	449	2	62	0
Nov	428	2	129	0
Dec	438	2	242	0
Total	7,358	7	1,271	1

Building Energy Consumption = 45,533 (Btu/Sq Ft/Year)  
Source Energy Consumption = 73,232 (Btu/Sq Ft/Year)

Floor Area = 3,343 (Sq Ft)





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UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 7.2 (kW)  
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.4	75.15
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Sub Total			5.4	75.15
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.76
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Sub Total			0.1	1.76
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Sub Total			0.0	0.00
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Miscellaneous

Lights			1.7	23.10
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Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			1.7	23.10
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Grand Total			7.2	100.00
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 321

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)

Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20

Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)

Design Simulation Period:	May	To September
System Simulation Period:	January	To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)	

Time/Date Program was Run:	12:38:18	1/24/94
Dataset Name:	CB321 .TM	

AIRFLOW - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	PTAC	0	848	848	1,203	356	0	0
2	RAD	0	0	0	0	552	0	0
Totals		0	848	848	1,203	908	0	0

CAPACITY - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	2.2	0.0	0.0	2.2	-35,740	0	0	0	0	0	-35,740
2	RAD	0.0	0.0	0.0	0.0	-55,996	0	0	0	0	0	-55,996
Totals		2.2	0.0	0.0	2.2	-91,735	0	0	0	0	0	-91,735

The building peaked at hour 16 month 7 with a capacity of 2.2 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- E N G I N E E R I N G   C H E C K S . -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	0.64	378.4	590.2	20.33	0.64	-27.03	1,322
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-27.71	2,021

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	545	0		545	2.03	*	623	3.30	*	-568	-568	1.59
Glass Solar	6,399	0		6,399	23.80	*	7,203	38.14	*	0	0	0.00
Glass Cond	1,365	0		1,365	5.08	*	1,264	6.69	*	-6,575	-6,575	18.46
Wall Cond	1,734	152		1,886	7.01	*	1,923	10.18	*	-3,216	-3,485	9.78
Partition	164			164	0.61	*	164	0.87	*	-229	-229	0.64
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	14,318			14,318	53.27	*	5,323	28.18	*	-24,763	-24,763	69.52
Sub Total==>	24,523	152		24,675	91.80	*	16,498	87.36	*	-35,349	-35,618	100.00
Internal Loads						*			*			
Lights	1,255	0		1,255	4.67	*	1,633	8.65	*	0	0	0.00
People	829			829	3.09	*	461	2.44	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	2,084	0	0	2,084	7.75	*	2,095	11.09	*	0	0	0.00
Ceiling Load	103	-103		0	0.00	*	293	1.55	*	-318	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				121	0.45	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	26,710	48	0	26,879	100.00	*	18,886	100.00	*	-35,667	-35,618	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	2.2	26.9	18.1	848 75.2 63.2 69.7	54.5 52.3 56.5	1,322		
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	252		
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	2.2	26.9				1,422	183	13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	0.64	SADB	54.5	106.7
Main Htg	-35.7	848	67.9	106.7	Infil	356	356	Clg Cfm/Ton	378.41	Plenum	75.2	67.7
Aux Htg	0.0	0	0.0	0.0	Supply	848	848	Clg Sqft/Ton	590.19	Return	75.1	67.8
Preheat	-0.0	848	67.8	54.4	Mincfm	0	0	Clg Btuh/Sqft	20.33	Ret/OA	75.1	67.8
Reheat	0.0	0	0.0	0.0	Return	848	848	No. People	3	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.64	Fn BldTD	0.0	0.0
Total	-35.7				Auxil	0	0	Htg Btuh/Sqft	-27.03	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/0 \* Mo/Hr: 0/0 \* Mo/Hr: 13/1  
Outside Air ==> OADB/WB/HR: 0/0/0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-1,234	-1,234	2.20
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-10,422	-10,422	18.61
Wall Cond	0	0		0	0.00	*	0	0.00	*	-5,094	-5,429	9.70
Partition	0			0	0.00	*	0	0.00	*	-446	-446	0.80
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-38,465	-38,465	68.69
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-55,660	-55,996	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0			0	0.00	*	0	0.00	*	-1,521	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-57,181	-55,996	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			AREAS		
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Floor	2,021	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	490	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Totals	0.0	0.0								Roof	678	0 0
										Wall	2,209	277 13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	AIRFLOWS (cfm)		--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-56.0	0	0.0	0.0	Infil	0	552	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	67.3
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-56.0				Auxil	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-27.71	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Windo	Wall	Ceil.		
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	18.4	6.48
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.5	6.05
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.0	5.93
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.6	10.28
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.044	0.000	36.4	11.77
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
System	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	18.4	6.48
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.5	6.05
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.0	5.93
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.6	10.28
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.044	0.000	36.4	11.77
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	13.2	5.30
7	BACK PORCH	0.000	0.000	0.000	0.000	0.033	1.040	1.086	0.044	0.000	52.3	14.55
8	BATH	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	22.6	7.44
9	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.8	10.32
10	STAIRS	0.032	0.000	0.000	0.000	0.033	0.610	0.625	0.044	0.000	22.9	8.03
11	BATH	0.032	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	34.4	11.37
Zone	2 Total/Ave.	0.032	0.000	0.000	0.000	0.029	0.619	0.636	0.044	0.568	26.7	8.74
System	2 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.573	0.587	0.044	0.568	23.0	7.78
Building		0.032	0.000	0.000	0.000	0.028	0.564	0.578	0.044	0.568	22.3	7.58



BUILDING AREAS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	SkI /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
		Flr	Rm										
1	DINING ROOM	1	1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
System	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
1	DINING ROOM	1	1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
6	KITCHEN	1	1	156	156	0	0	0	0	0	13	11	104
7	BACK PORCH	1	1	59	59	0	0	0	0	59	11	6	185
8	BATH	1	1	90	90	0	0	0	0	0	21	13	140
9	BEDROOM	1	1	148	148	0	0	0	0	148	30	14	187
10	STAIRS	1	1	170	170	112	0	0	0	78	20	21	76
11	BATH	1	1	76	76	126	0	0	0	76	0	0	0
Zone	2 Total/Ave.				699	238	0	0	0	361	95	12	692
System	2 Total/Ave.				2,021	490	0	0	0	678	277	13	1,932
Building					3,343	742	0	0	0	995	460	13	3,172

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.028 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.110 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.092 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.21 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 12.48 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (cfm)	Hours (%)	Hours	Cap. (cfm)	Hours (%)	Hours
0 - 5	0.1	8	76	-4,587	11	500	42.4	0	0	0.0	0	0
5 - 10	0.2	9	84	-9,174	17	764	84.8	0	0	0.0	0	0
10 - 15	0.3	8	77	-13,760	15	661	127.1	0	0	0.0	0	0
15 - 20	0.4	4	39	-18,347	19	856	169.5	42	1,530	0.0	0	0
20 - 25	0.6	5	50	-22,934	18	811	211.9	0	0	0.0	0	0
25 - 30	0.7	13	123	-27,521	12	529	254.3	0	0	0.0	0	0
30 - 35	0.8	8	82	-32,107	9	394	296.7	0	0	0.0	0	0
35 - 40	0.9	7	64	-36,694	0	0	339.0	0	0	0.0	0	0
40 - 45	1.0	9	86	-41,281	0	0	381.4	0	0	0.0	0	0
45 - 50	1.1	13	127	-45,868	0	0	423.8	21	765	0.0	0	0
50 - 55	1.2	6	54	-50,454	0	0	466.2	0	0	0.0	0	0
55 - 60	1.3	6	62	-55,041	0	0	508.6	0	0	0.0	0	0
60 - 65	1.5	2	20	-59,628	0	0	551.0	0	0	0.0	0	0
65 - 70	1.6	0	0	-64,215	0	0	593.3	0	0	0.0	0	0
70 - 75	1.7	0	0	-68,802	0	0	635.7	0	0	0.0	0	0
75 - 80	1.8	0	0	-73,388	0	0	678.1	0	0	0.0	0	0
80 - 85	1.9	0	0	-77,975	0	0	720.5	0	0	0.0	0	0
85 - 90	2.0	0	0	-82,562	0	0	762.9	0	0	0.0	0	0
90 - 95	2.1	0	0	-87,149	0	0	805.2	0	0	0.0	0	0
95 - 100	2.2	3	31	-91,735	0	0	847.6	38	1,377	0.0	0	0
Hours Off	0.0	0	7,785	0	0	4,245	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----		
Range (F)	1	1	2

Max. Temp.	80.9	105.5	110.5
Mo./Hr.	7 14	8 21	8 21
Day Type	1	1	1

	..... Number of Hours .....		
Above 100	0	1,232	2,177
95 - 100	0	1,168	751
90 - 95	0	362	62
85 - 90	0	383	348
80 - 85	0	509	351
75 - 80	2,852	18	102
70 - 75	820	17	453
65 - 70	85	5,071	4,516
60 - 65	734	0	0
55 - 60	856	0	0
50 - 55	537	0	0
Below 50	2,876	0	0

Min. Temp.	33.2	67.9	67.9
Mo./Hr.	2 10	1 8	1 20
Day Type	4	2	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kwh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	443	2	165	0
Feb	401	2	167	0
March	454	2	107	0
April	427	2	41	0
May	478	2	0	0
June	794	5	0	0
July	1,129	5	0	0
Aug	796	5	0	0
Sept	456	5	0	0
Oct	448	2	21	0
Nov	427	2	67	0
Dec	438	2	134	0
Total	6,690	5	700	0

Building Energy Consumption = 27,772 (Btu/Sq Ft/Year)  
Source Energy Consumption = 48,415 (Btu/Sq Ft/Year)

Floor Area = 3,343 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

[illegible]

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 5.4 (kW)  
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	3.7	67.87
---	--------	----------------------------	-----	-------

Sub Total			3.7	67.87
-----------	--	--	-----	-------

Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.34
---	--	------------------------------------	-----	------

Sub Total			0.1	1.34
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Sub Total			0.0	0.00
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Miscellaneous

Lights			1.7	30.79
--------	--	--	-----	-------

Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			1.7	30.79
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Grand Total			5.4	100.00
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 321

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:50:55 1/24/94  
Dataset Name: CB321 .TM



AIRFLOW - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply	Room Exhaust
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Airflow (Cfm)	Airflow (Cfm)
1	PTAC	0	1,511	1,511	1,853	341	0	0
2	RAD	0	0	0	0	530	0	0
Totals		0	1,511	1,511	1,853	872	0	0

CAPACITY - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	3.2	0.0	0.0	3.2	-53,271	0	0	0	0	0	-53,271
2	RAD	0.0	0.0	0.0	0.0	-82,616	0	0	0	0	0	-82,616
Totals		3.2	0.0	0.0	3.2	-135,887	0	0	0	0	0	-135,887

The building peaked at hour 16 month 7 with a capacity of 3.0 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.14	474.5	415.1	28.91	1.14	-40.30	1,322
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-40.88	2,021

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	576	0		576	1.51	*	599	1.98	*	-568	-568	1.08
Glass Solar	7,238	0		7,238	18.94	*	7,707	25.42	*	0	0	0.00
Glass Cond	1,264	0		1,264	3.31	*	1,153	3.80	*	-6,575	-6,575	12.47
Wall Cond	13,215	1,095		14,310	37.44	*	13,690	45.15	*	-19,941	-21,586	40.94
Partition	164			164	0.43	*	164	0.54	*	-229	-229	0.43
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	12,308			12,308	32.20	*	4,827	15.92	*	-23,772	-23,772	45.08
Sub Total==>	34,765	1,095		35,860	93.82	*	28,139	92.80	*	-51,084	-52,729	100.00
Internal Loads						*			*			
Lights	1,296	0		1,296	3.39	*	1,312	4.33	*	0	0	0.00
People	850			850	2.22	*	426	1.40	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	2,146	0	0	2,146	5.61	*	1,738	5.73	*	0	0	0.00
Ceiling Load	377	-377		0	0.00	*	446	1.47	*	-569	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				215	0.56	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	37,288	718	0	38,221	100.00	*	30,323	100.00	*	-51,654	-52,729	100.00

-----COOLING COIL SELECTION-----											-----AREAS-----		
	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR				Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	3.2	38.2	30.8	1,511	75.6	62.6	66.5	56.5	54.0	59.9	Part	1,322	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	252	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	317	0 0
Totals	3.2	38.2									Wall	1,422	183 13

-----HEATING COIL SELECTION-----				-----AIRFLOWS (cfm)-----				-----ENGINEERING CHECKS-----			-----TEMPERATURES (F)-----		
	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA			Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft					
Main Htg	-53.3	1,511	67.0	99.4	Infil	341		Clg Cfm/Ton	474.53		SADB	56.6	99.4
Aux Htg	0.0	0	0.0	0.0	Supply	1,511	1,511	Clg Sqft/Ton	415.06		Plenum	75.7	66.8
Preheat	-0.0	1,511	67.1	56.4	Mincfm	0	0	Clg Btuh/Sqft	28.91		Return	75.5	67.1
Reheat	0.0	0	0.0	0.0	Return	1,511	1,511	No. People	3		Ret/OA	75.5	67.1
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0		Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	1.14		Fn MtrTD	0.0	0.0
Total	-53.3				Auxil	0	0	Htg Btuh/Sqft	-40.30		Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct	Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot	Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)	(Btuh)	(Btuh)	(%)
Envelope Loads											
Skylite Solr	0	0		0	0.00	*	0	0.00	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	-1,234	-1,234	1.49
Glass Solar	0	0		0	0.00	*	0	0.00	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	-10,422	-10,422	12.61
Wall Cond	0	0		0	0.00	*	0	0.00	-31,588	-33,588	40.66
Partition	0			0	0.00	*	0	0.00	-446	-446	0.54
Exposed Floor	0			0	0.00	*	0	0.00	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	-36,927	-36,927	44.70
Sub Total==>	0	0		0	0.00	*	0	0.00	-80,616	-82,616	100.00
Internal Loads						*					
Lights	0	0		0	0.00	*	0	0.00	0	0	0.00
People	0			0	0.00	*	0	0.00	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	-3,111	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	-83,726	-82,616	100.00

-----COOLING COIL SELECTION-----										-----AREAS-----		
	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	490	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	678	0 0
Totals	0.0	0.0								Wall	2,209	277 13

-----HEATING COIL SELECTION-----				-----AIRFLOWS (cfm)-----				-----ENGINEERING CHECKS-----		-----TEMPERATURES (F)-----		
	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA		Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	0.0	SADB	0.0	68.1
Main Htg	-82.6	0	0.0	0.0	Infil	0	530	Clg Cfm/Ton	0.00	Plenum	0.0	65.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
Total	-82.6				Auxil	0	0	Htg Btuh/Sqft	-40.88	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	17.3	6.25
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.5	5.85
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.1	5.74
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.3	10.03
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.272	0.000	36.1	11.72
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09
System	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	17.3	6.25
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.5	5.85
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	15.1	5.74
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.3	10.03
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.272	0.000	36.1	11.72
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.272	0.568	20.2	7.09
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	12.6	5.17
7	BACK PORCH	0.000	0.000	0.000	0.000	0.033	1.040	1.086	0.272	0.000	49.1	13.92
8	BATH	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.272	0.568	21.1	7.12
9	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.272	0.000	32.5	10.07
10	STAIRS	0.032	0.000	0.000	0.000	0.033	0.610	0.625	0.272	0.000	22.5	7.94
11	BATH	0.032	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	34.4	11.37
Zone	2 Total/Ave.	0.032	0.000	0.000	0.000	0.029	0.619	0.636	0.272	0.568	25.8	8.55
System	2 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.573	0.587	0.272	0.568	22.1	7.59
Building		0.032	0.000	0.000	0.000	0.028	0.564	0.578	0.272	0.568	21.3	7.39

BUILDING AREAS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Min /Wl (%)	Net Wall Area (sqft)
1	DINING ROOM	1	1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
System	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
1	DINING ROOM	1	1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
6	KITCHEN	1	1	156	156	0	0	0	0	0	13	11	104
7	BACK PORCH	1	1	59	59	0	0	0	0	59	11	6	185
8	BATH	1	1	90	90	0	0	0	0	0	21	13	140
9	BEDROOM	1	1	148	148	0	0	0	0	148	30	14	187
10	STAIRS	1	1	170	170	112	0	0	0	78	20	21	76
11	BATH	1	1	76	76	126	0	0	0	76	0	0	0
Zone	2 Total/Ave.				699	238	0	0	0	361	95	12	692
System	2 Total/Ave.				2,021	490	0	0	0	678	277	13	1,932
Building					3,343	742	0	0	0	995	460	13	3,172

ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.028 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.309 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.249 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.21 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 21.47 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.2	10	114	-6,794	11	506	75.6	0	0	0.0	0	0
5 - 10	0.3	12	127	-13,589	14	670	151.1	0	0	0.0	0	0
10 - 15	0.5	5	56	-20,383	13	620	226.7	0	0	0.0	0	0
15 - 20	0.6	4	39	-27,177	19	869	302.3	42	1,530	0.0	0	0
20 - 25	0.8	4	43	-33,972	16	755	377.9	0	0	0.0	0	0
25 - 30	1.0	10	114	-40,766	13	586	453.4	0	0	0.0	0	0
30 - 35	1.1	14	151	-47,560	12	563	529.0	0	0	0.0	0	0
35 - 40	1.3	6	64	-54,355	2	94	604.6	0	0	0.0	0	0
40 - 45	1.4	9	104	-61,149	0	0	680.1	0	0	0.0	0	0
45 - 50	1.6	12	129	-67,944	0	0	755.7	21	765	0.0	0	0
50 - 55	1.8	3	31	-74,738	0	0	831.3	0	0	0.0	0	0
55 - 60	1.9	7	73	-81,532	0	0	906.9	0	0	0.0	0	0
60 - 65	2.1	2	20	-88,327	0	0	982.4	0	0	0.0	0	0
65 - 70	2.2	0	0	-95,121	0	0	1,058.0	0	0	0.0	0	0
70 - 75	2.4	0	0	-101,915	0	0	1,133.6	0	0	0.0	0	0
75 - 80	2.5	0	0	-108,710	0	0	1,209.1	0	0	0.0	0	0
80 - 85	2.7	0	0	-115,504	0	0	1,284.7	0	0	0.0	0	0
85 - 90	2.9	0	0	-122,298	0	0	1,360.3	0	0	0.0	0	0
90 - 95	3.0	0	0	-129,093	0	0	1,435.8	0	0	0.0	0	0
95 - 100	3.2	3	31	-135,887	0	0	1,511.4	38	1,377	0.0	0	0
Hours Off	0.0	0	7,664	0	0	4,097	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
 WEATHERSTRIP & CAULKING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature Range (F)	Zone Number		
	1	1	2

Max. Temp.	82.3	100.5	103.6
Mo./Hr.	7 14	7 21	8 20
Day Type	1	1	1

	Number of Hours		
Above 100	0	0	79
95 - 100	0	249	748
90 - 95	0	928	1,340
85 - 90	0	935	882
80 - 85	0	1,066	553
75 - 80	2,512	486	87
70 - 75	1,029	8	524
65 - 70	165	5,088	4,547
60 - 65	710	0	0
55 - 60	800	0	0
50 - 55	770	0	0
Below 50	2,774	0	0

Min. Temp.	31.4	67.9	67.9
Mo./Hr.	2 9	3 20	1 20
Day Type	4	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	444	2	262	0
Feb	401	2	257	0
March	455	2	167	0
April	427	2	68	0
May	558	6	0	0
June	952	7	0	0
July	1,399	7	0	0
Aug	934	7	0	0
Sept	498	6	0	0
Oct	449	2	53	0
Nov	428	2	116	0
Dec	438	2	222	0
Total	7,381	7	1,144	0

Building Energy Consumption = 41,771 (Btu/Sq Ft/Year)  
Source Energy Consumption = 68,256 (Btu/Sq Ft/Year)

Floor Area = 3,343 (Sq Ft)



## ----- EQUIPMENT ENERGY CONSUMPTION -----

[illegible]

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 6.9 (kW)  
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.1	73.95
Sub Total			5.1	73.95
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.87
Sub Total			0.1	1.87
Sub Total			0.0	0.00

Miscellaneous

Lights	1.7	24.18
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	1.7	24.18
Grand Total	6.9	100.00

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**          T R A C E    6 0 0    A N A L Y S I S          **  
**                                     **  
**          by              **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 321

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	13: 2:48 1/24/94
Dataset Name:	C8321 .TM

AIRFLOW - ALTERNATIVE 4  
COMBINED ECOS

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	PTAC	0	777	777	1,062	284	0	0
2	RAD	0	0	0	0	442	0	0
Totals		0	777	777	1,062	726	0	0

CAPACITY - ALTERNATIVE 4  
COMBINED ECOS

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	2.0	0.0	0.0	2.0	-30,779	0	0	0	0	0	-30,779
2	RAD	0.0	0.0	0.0	0.0	-48,303	0	0	0	0	0	-48,303
Totals		2.0	0.0	0.0	2.0	-79,082	0	0	0	0	0	-79,082

The building peaked at hour 16 month 7 with a capacity of 2.0 tons

ENGINEERING CHECKS - ALTERNATIVE 4  
COMBINED ECOS

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	0.59	388.1	660.1	18.18	0.59	-23.28	1,322
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-23.90	2,021

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	545	0		545	2.27	*	623	3.49	*	-568	-568	1.85
Glass Solar	6,632	0		6,632	27.60	*	7,203	40.39	*	0	0	0.00
Glass Cond	1,296	0		1,296	5.39	*	1,264	7.09	*	-6,575	-6,575	21.44
Wall Cond	1,763	155		1,919	7.98	*	1,923	10.78	*	-3,216	-3,485	11.36
Partition	164			164	0.68	*	164	0.92	*	-229	-229	0.75
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	11,273			11,273	46.91	*	4,258	23.88	*	-19,810	-19,810	64.60
Sub Total==>	21,674	155		21,829	90.83	*	15,434	86.54	*	-30,397	-30,666	100.00
Internal Loads						*			*			
Lights	1,263	0		1,263	5.25	*	1,633	9.16	*	0	0	0.00
People	832			832	3.46	*	461	2.59	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	2,094	0	0	2,094	8.71	*	2,095	11.75	*	0	0	0.00
Ceiling Load	108	-108		0	0.00	*	305	1.71	*	-335	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				111	0.46	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	23,876	47	0	24,034	100.00	*	17,834	100.00	*	-30,732	-30,666	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	2.0	24.0	777	75.2 62.5 66.5	53.8 51.8 55.4	1,322		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	252		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	2.0	24.0				317	0	0
						1,422	183	13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	0.59	SADB	53.9	104.3
Main Htg	-30.8	777	67.9	104.3	Infil	284	284	Clg Cfm/Ton	388.10	Plenum	75.2	67.7
Aux Htg	0.0	0	0.0	0.0	Supply	777	777	Clg Sqft/Ton	660.07	Return	75.1	67.8
Preheat	-0.0	777	67.8	53.8	Mincfm	0	0	Clg Btuh/Sqft	18.18	Ret/OA	75.1	67.8
Reheat	0.0	0	0.0	0.0	Return	777	777	No. People	3	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.59	Fn BldTD	0.0	0.0
Total	-30.8				Auxil	0	0	Htg Btuh/Sqft	-23.28	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/0 \* Mo/Hr: 0/0 \* Mo/Hr: 13/1  
Outside Air ==> OADB/WB/HR: 0/0/0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-1,234	-1,234	2.55
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-10,422	-10,422	21.58
Wall Cond	0	0		0	0.00	*	0	0.00	*	-5,094	-5,429	11.24
Partition	0			0	0.00	*	0	0.00	*	-446	-446	0.92
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-30,772	-30,772	63.71
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-47,967	-48,303	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-1,521	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-49,488	-48,303	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	2,021		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	490	
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	0.0	0.0				Roof	678	0 0
						Wall	2,209	277 13

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Main Htg	-48.3	0	0.0	0.0	Infil	0	442	Clg Cfm/Ton	0.00	Plenum	0.0	67.3
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
Total	-48.3				Auxil	0	0	Htg Btuh/Sqft	-23.90	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 4  
COMBINED ECOS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	18.4	6.48
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.5	6.05
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.0	5.93
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.6	10.28
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.044	0.000	36.4	11.77
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
System	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
1	DINING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	18.4	6.48
2	LIVING ROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.5	6.05
3	MASTER BEDROOM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	16.0	5.93
4	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.6	10.28
5	3RD FLOOR	0.032	0.000	0.000	0.000	0.033	0.550	0.563	0.044	0.000	36.4	11.77
Zone	1 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.550	0.563	0.044	0.568	21.1	7.28
6	KITCHEN	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	13.2	5.30
7	BACK PORCH	0.000	0.000	0.000	0.000	0.033	1.040	1.086	0.044	0.000	52.3	14.55
8	BATH	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.044	0.568	22.6	7.44
9	BEDROOM	0.000	0.000	0.000	0.000	0.023	0.550	0.563	0.044	0.000	33.8	10.32
10	STAIRS	0.032	0.000	0.000	0.000	0.033	0.610	0.625	0.044	0.000	22.9	8.03
11	BATH	0.032	0.000	0.000	0.000	0.033	0.000	0.000	0.000	0.000	34.4	11.37
Zone	2 Total/Ave.	0.032	0.000	0.000	0.000	0.029	0.619	0.636	0.044	0.568	26.7	8.74
System	2 Total/Ave.	0.032	0.000	0.000	0.000	0.028	0.573	0.587	0.044	0.568	23.0	7.78
Building		0.032	0.000	0.000	0.000	0.028	0.564	0.578	0.044	0.568	22.3	7.58



BUILDING AREAS - ALTERNATIVE 4  
COMBINED ECOS

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	DINING ROOM	1	1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
System	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
1	DINING ROOM	1	1	181	181	0	0	0	0	0	33	14	210
2	LIVING ROOM	1	1	539	539	0	0	0	0	0	66	11	528
3	MASTER BEDROOM	1	1	285	285	0	0	0	0	0	45	15	265
4	BEDROOM	1	1	157	157	0	0	0	0	157	30	13	195
5	3RD FLOOR	1	1	160	160	252	0	0	0	160	9	17	41
Zone	1 Total/Ave.				1,322	252	0	0	0	317	183	13	1,240
6	KITCHEN	1	1	156	156	0	0	0	0	0	13	11	104
7	BACK PORCH	1	1	59	59	0	0	0	0	59	11	6	185
8	BATH	1	1	90	90	0	0	0	0	0	21	13	140
9	BEDROOM	1	1	148	148	0	0	0	0	148	30	14	187
10	STAIRS	1	1	170	170	112	0	0	0	78	20	21	76
11	BATH	1	1	76	76	126	0	0	0	76	0	0	0
Zone	2 Total/Ave.				699	238	0	0	0	361	95	12	692
System	2 Total/Ave.				2,021	490	0	0	0	678	277	13	1,932
Building					3,343	742	0	0	0	995	460	13	3,172

ASHRAE 90 ANALYSIS - ALTERNATIVE 4  
COMBINED ECOS

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.028 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.110 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.092 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.21 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 12.48 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4  
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.1	7	73	-3,954	13	587	38.9	0	0	0.0	0	0
5 - 10	0.2	9	94	-7,908	16	688	77.7	0	0	0.0	0	0
10 - 15	0.3	6	62	-11,862	15	636	116.6	0	0	0.0	0	0
15 - 20	0.4	3	30	-15,816	20	873	155.5	42	1,530	0.0	0	0
20 - 25	0.5	6	67	-19,770	15	666	194.3	0	0	0.0	0	0
25 - 30	0.6	8	82	-23,725	13	569	233.2	0	0	0.0	0	0
30 - 35	0.7	16	171	-27,679	8	357	272.0	0	0	0.0	0	0
35 - 40	0.8	8	88	-31,633	0	0	310.9	0	0	0.0	0	0
40 - 45	0.9	4	47	-35,587	0	0	349.8	0	0	0.0	0	0
45 - 50	1.0	10	107	-39,541	0	0	388.6	21	765	0.0	0	0
50 - 55	1.1	13	144	-43,495	0	0	427.5	0	0	0.0	0	0
55 - 60	1.2	1	11	-47,449	0	0	466.4	0	0	0.0	0	0
60 - 65	1.3	4	40	-51,403	0	0	505.2	0	0	0.0	0	0
65 - 70	1.4	2	20	-55,357	0	0	544.1	0	0	0.0	0	0
70 - 75	1.5	1	11	-59,311	0	0	583.0	0	0	0.0	0	0
75 - 80	1.6	0	0	-63,266	0	0	621.8	0	0	0.0	0	0
80 - 85	1.7	0	0	-67,220	0	0	660.7	0	0	0.0	0	0
85 - 90	1.8	0	0	-71,174	0	0	699.6	0	0	0.0	0	0
90 - 95	1.9	0	0	-75,128	0	0	738.4	0	0	0.0	0	0
95 - 100	2.0	3	31	-79,082	0	0	777.3	38	1,377	0.0	0	0
Hours Off	0.0	0	7,682	0	0	4,384	0.0	0	5,088	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4  
COMBINED ECOS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----		
Range (F)	1	1	2

Max. Temp.	80.8	105.5	110.5
Mo./Hr.	7 14	8 21	8 21
Day Type	1	1	1

	..... Number of Hours .....		
Above 100	0	1,232	2,221
95 - 100	0	1,168	707
90 - 95	0	362	70
85 - 90	0	383	348
80 - 85	0	509	394
75 - 80	2,999	18	348
70 - 75	673	85	368
65 - 70	276	5,003	4,304
60 - 65	752	0	0
55 - 60	733	0	0
50 - 55	620	0	0
Below 50	2,707	0	0

Min. Temp.	34.2	67.9	67.9
Mo./Hr.	2 10	2 12	1 21
Day Type	5	2	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4  
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kwh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMHD On Peak (Thrm/hr)
Jan	443	2	139	0
Feb	400	2	140	0
March	454	2	86	0
April	427	2	29	0
May	487	4	0	0
June	810	5	0	0
July	1,124	5	0	0
Aug	818	5	0	0
Sept	453	5	0	0
Oct	448	2	13	0
Nov	427	2	54	0
Dec	438	2	114	0
Total	6,730	5	574	0

Building Energy Consumption = 24,033 (Btu/Sq Ft/Year)  
Source Energy Consumption = 43,497 (Btu/Sq Ft/Year)

Floor Area = 3,343 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

[illegible]

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4  
COMBINED ECOS

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        5.1    (kW)  
Yearly Time of Peak 16 (hr)    7 (mo)

Hour 16   Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLO COND COMP <15 TONS	3.3	65.68
---	--------	----------------------------	-----	-------

Sub Total			3.3	65.68
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.1	1.31
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Sub Total			0.1	1.31
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Sub Total			0.0	0.00
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Miscellaneous

Lights			1.7	33.00
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Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			1.7	33.00
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Grand Total			5.1	100.00
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*Building 330*  
*Trace Input File*

933702



CONTENTS OF : E:\CB330.TM

LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 330

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/BASE BUILDING

13 20/1/1/MEN/105/1//0//10.3

14 20/2/1/WOMEN/87/1//0//10.3

15 20/3/1/ENGR RESOURCES/1062/1//0//10.3

16 20/4/1/OFFICE/135/1//0//10.3

17 20/5/1/ENTRANCE/120/1//0//10.3

18 20/6/2/PRINT ROOM/169/1//0//10.3

19 20/7/2/ENGINEERING/657/1//0//10.3

20 20/8/2/HALL/194/1//0//10.3

21 20/9/2/OFFICE/140/1//0//10.3

22 20/10/2/RECEPTION/105/1//0//10.3

23 20/11/2/OFFICE/293/1//0//10.3

24 20/12/2/SECRETARY/91/1//0//10.3

25 20/13/3/COMPUTER ROOM/361/1//0//10.5

26 21/M////CBADCTX///CBADHTX

27 22/M/1/YES////163

28 22/13/1/YES////163

29 24/1/1/11.75/9//164/180

30 24/1/2/9/9//164/270

31 24/2/1/12/9//164/180

32 24/3/1/22/9//164/90

33 24/3/2/49/9//164/270

34 24/5/1/18/9//165/90

35 24/5/2/7/9//165/180

36 24/6/1/12.5/9//165/0

37 24/6/2/13.5/9//165/270

38 24/7/1/25/9//165/0

39 24/7/2/26/9//165/180

40 24/7/3/10.5/9//165/270

41 24/9/1/15.5/9//165/0

42 24/11/1/18/9//165/0

43 24/11/2/16.5/9//165/90

44 24/12/1/8/9//165/90

45 24/12/2/12/9//165/180

46 24/13/1/19/9.75//166/0

47 24/13/2/19/9.75//166/90

48 24/13/3/19/9.75//166/180

49 25/1/1/5/2/1/1.04/.95

50 25/1/2/5/2/1/1.04/.95

51 25/2/1/5/2/1/1.04/.95

52 25/3/1/5/2/6/1.04/.95

53 25/3/2/5/2/10/1.04/.95

54 25/5/1/3/1.5/4/1.04/.95

55 25/5/2/3/2/1/1.04/.95

56 25/6/1/4/2/2/1.04/.95

57 25/6/2/4/2/2/1.04/.95

58 25/7/1/4/2/6/1.04/.95

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LINE #	-----
59	25/7/2/3.5/1.5/3/1.04/.95
60	25/7/3/4/2/1/1.04/.95
61	25/9/1/4/2/3/1.04/.95
62	25/11/1/4/2/4/1.04/.95
63	25/11/2/4/2/4/1.04/.95
64	25/12/1/4/2/1/1.04/.95
65	25/12/2/4/2/3/1.04/.95
66	25/13/1/5/1.5/1/1.04/.95
67	25/13/2/5/1.5/2/1.04/.95
68	25/13/3/5/1.5/1/1.04/.95
69	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/CBADHTG/OFF/CBADP&L/OFF
70	27/1/////1.8/WATT-SF/ASHRAE2
71	27/2/////2.2/WATT-SF/ASHRAE2
72	27/3/5/PEOPLE/255/255/3.6/WATT-SF/ASHRAE2
73	27/4/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
74	27/6/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
75	27/7/3/PEOPLE/255/255/3.2/WATT-SF/ASHRAE2
76	27/8/////4.4/WATT-SF/ASHRAE2
77	27/9/1/PEOPLE/255/255/4.8/WATT-SF/ASHRAE2
78	27/10/////2.7/WATT-SF/ASHRAE2
79	27/11/1/PEOPLE/255/255/2.6/WATT-SF/ASHRAE2
80	27/12/1/PEOPLE/255/255/2.1/WATT-SF/ASHRAE2
81	27/13/4/PEOPLE/255/255/1.6/WATT-SF/ASHRAE2
82	28/3/1/PC'S/1.4/WATT-SF/CBADP&L
83	28/4/1/PC'S/1/WATT-SF/CBADP&L
84	28/7/1/PC'S/1/WATT-SF/CBADP&L
85	28/8/1/COPIER/4/WATT-SF/CBADP&L
86	28/9/1/PC'S/1/WATT-SF/CBADP&L
87	28/13/1/PC'S/6.8/WATT-SF/CBADP&L
88	29/M///// .26/CFM-SF/.26/CFM-SF
89	30/1/136/CFM/////////136/CFM
90	30/2/136/CFM/////////136/CFM
91	30/3/1350/CFM
92	30/4/150/CFM
93	30/5/200/CFM
94	30/6/500/CFM
95	30/7/720/CFM
96	30/8/240/CFM
97	30/9/120/CFM
98	30/10/125/CFM
99	30/11/380/CFM
100	30/12/125/CFM
101	30/13/1460/CFM/1460/CFM
102	SYSTEM - 1
103	39/1/BASE BUILDING
104	40/1/SZ
105	41/1/1/2
106	42/1/.5///// .1
107	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
108	40/2/RAD
109	41/2/1/2
110	42/2
111	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
112	40/3/COMP
113	41/3/3/3
114	42/3/.2/.2
115	45/3/CBADCLG/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
116	EQUIPMENT - 1

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LINE #	
117	59/1/CARLISLE///BASE BUILDING
118	60/1/1/BLKPLANT/1/1
119	60/2/2/BLKPLANT/3/3
120	62/1/EQ1161/2/60/MBH
121	62/2/EQ1161/2/24/MBH
122	65/1/1//2/2
123	67/1/EQ2102/1/18/FT-WATER/120/MBH
124	69/1/EQ4003
125	69/3/EQ4003/EQ4003
126	LOAD - 2
127	19/2/WEATHERSTRIP & CAULKING
128	20/1/1/MEN/105/1//0//10.3
129	20/2/1/WOMEN/87/1//0//10.3
130	20/3/1/ENGR RESOURCES/1062/1//0//10.3
131	20/4/1/OFFICE/135/1//0//10.3
132	20/5/1/ENTRANCE/120/1//0//10.3
133	20/6/2/PRINT ROOM/169/1//0//10.3
134	20/7/2/ENGINEERING/657/1//0//10.3
135	20/8/2/HALL/194/1//0//10.3
136	20/9/2/OFFICE/140/1//0//10.3
137	20/10/2/RECEPTION/105/1//0//10.3
138	20/11/2/OFFICE/293/1//0//10.3
139	20/12/2/SECRETARY/91/1//0//10.3
140	20/13/3/COMPUTER ROOM/361/1//0//10.5
141	21/M////CBADCTX///CBADHTX
142	22/M/1/YES////163
143	22/13/1/YES////163
144	24/1/1/11.75/9//164/180
145	24/1/2/9/9//164/270
146	24/2/1/12/9//164/180
147	24/3/1/22/9//164/90
148	24/3/2/49/9//164/270
149	24/5/1/18/9//165/90
150	24/5/2/7/9//165/180
151	24/6/1/12.5/9//165/0
152	24/6/2/13.5/9//165/270
153	24/7/1/25/9//165/0
154	24/7/2/26/9//165/180
155	24/7/3/10.5/9//165/270
156	24/9/1/15.5/9//165/0
157	24/11/1/18/9//165/0
158	24/11/2/16.5/9//165/90
159	24/12/1/8/9//165/90
160	24/12/2/12/9//165/180
161	24/13/1/19/9.75//166/0
162	24/13/2/19/9.75//166/90
163	24/13/3/19/9.75//166/180
164	25/1/1/5/2/1/1.04/.95
165	25/1/2/5/2/1/1.04/.95
166	25/2/1/5/2/1/1.04/.95
167	25/3/1/5/2/6/1.04/.95
168	25/3/2/5/2/10/1.04/.95
169	25/5/1/3/1.5/4/1.04/.95
170	25/5/2/3/2/1/1.04/.95
171	25/6/1/4/2/2/1.04/.95
172	25/6/2/4/2/2/1.04/.95
173	25/7/1/4/2/6/1.04/.95
174	25/7/2/3.5/1.5/3/1.04/.95

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LINE #	-----
175	25/7/3/4/2/1/1.04/.95
176	25/9/1/4/2/3/1.04/.95
177	25/11/1/4/2/4/1.04/.95
178	25/11/2/4/2/4/1.04/.95
179	25/12/1/4/2/1/1.04/.95
180	25/12/2/4/2/3/1.04/.95
181	25/13/1/5/1.5/1/1.04/.95
182	25/13/2/5/1.5/2/1.04/.95
183	25/13/3/5/1.5/1/1.04/.95
184	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/CBADHTG/OFF/CBADP&L/OFF
185	27/1/////1.8/WATT-SF/ASHRAE2
186	27/2/////2.2/WATT-SF/ASHRAE2
187	27/3/5/PEOPLE/255/255/3.6/WATT-SF/ASHRAE2
188	27/4/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
189	27/6/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
190	27/7/3/PEOPLE/255/255/3.2/WATT-SF/ASHRAE2
191	27/8/////4.4/WATT-SF/ASHRAE2
192	27/9/1/PEOPLE/255/255/4.8/WATT-SF/ASHRAE2
193	27/10/////2.7/WATT-SF/ASHRAE2
194	27/11/1/PEOPLE/255/255/2.6/WATT-SF/ASHRAE2
195	27/12/1/PEOPLE/255/255/2.1/WATT-SF/ASHRAE2
196	27/13/4/PEOPLE/255/255/1.6/WATT-SF/ASHRAE2
197	28/3/1/PC'S/1.4/WATT-SF/CBADP&L
198	28/4/1/PC'S/1/WATT-SF/CBADP&L
199	28/7/1/PC'S/1/WATT-SF/CBADP&L
200	28/8/1/COPIER/4/WATT-SF/CBADP&L
201	28/9/1/PC'S/1/WATT-SF/CBADP&L
202	28/13/1/PC'S/6.8/WATT-SF/CBADP&L
203	29/M/////19/CFM-SF/.19/CFM-SF
204	30/1/136/CFM////////136/CFM
205	30/2/136/CFM////////136/CFM
206	30/3/1350/CFM
207	30/4/150/CFM
208	30/5/200/CFM
209	30/6/500/CFM
210	30/7/720/CFM
211	30/8/240/CFM
212	30/9/120/CFM
213	30/10/125/CFM
214	30/11/380/CFM
215	30/12/125/CFM
216	30/13/1460/CFM/1460/CFM
217	SYSTEM - 2
218	39/2/WEATHERSTRIP & CAULKING
219	40/1/SZ
220	41/1/1/2
221	42/1/.5/////1
222	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
223	40/2/RAD
224	41/2/1/2
225	42/2
226	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
227	40/3/COMP
228	41/3/3/3
229	42/3/.2/.2
230	45/3/CBADCLG/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
231	EQUIPMENT - 2
232	59/2/CARLISLE//WEATHERSTRIP & CAULKING

CONTENTS OF : E:\CB330.TM

LINE #	
233	60/1/1/BLKPLANT/1/1
234	60/2/2/BLKPLANT/3/3
235	62/1/EQ1161/2/60/MBH
236	62/2/EQ1161/2/24/MBH
237	65/1/1//2/2
238	67/1/EQ2102/1/18/FT-WATER/120/MBH
239	69/1/EQ4003
240	69/3/EQ4003/EQ4003
241	LOAD - 3
242	19/3/REPLACE FLUORESCENT LAMPS
243	20/1/1/MEN/105/1//0//10.3
244	20/2/1/WOMEN/87/1//0//10.3
245	20/3/1/ENGR RESOURCES/1062/1//0//10.3
246	20/4/1/OFFICE/135/1//0//10.3
247	20/5/1/ENTRANCE/120/1//0//10.3
248	20/6/2/PRINT ROOM/169/1//0//10.3
249	20/7/2/ENGINEERING/657/1//0//10.3
250	20/8/2/HALL/194/1//0//10.3
251	20/9/2/OFFICE/140/1//0//10.3
252	20/10/2/RECEPTION/105/1//0//10.3
253	20/11/2/OFFICE/293/1//0//10.3
254	20/12/2/SECRETARY/91/1//0//10.3
255	20/13/3/COMPUTER ROOM/361/1//0//10.5
256	21/M///CBADCTX///CBADHTX
257	22/M/1/YES///163
258	22/13/1/YES///163
259	24/1/1/11.75/9//164/180
260	24/1/2/9/9//164/270
261	24/2/1/12/9//164/180
262	24/3/1/22/9//164/90
263	24/3/2/49/9//164/270
264	24/5/1/18/9//165/90
265	24/5/2/7/9//165/180
266	24/6/1/12.5/9//165/0
267	24/6/2/13.5/9//165/270
268	24/7/1/25/9//165/0
269	24/7/2/26/9//165/180
270	24/7/3/10.5/9//165/270
271	24/9/1/15.5/9//165/0
272	24/11/1/18/9//165/0
273	24/11/2/16.5/9//165/90
274	24/12/1/8/9//165/90
275	24/12/2/12/9//165/180
276	24/13/1/19/9.75//166/0
277	24/13/2/19/9.75//166/90
278	24/13/3/19/9.75//166/180
279	25/1/1/5/2/1/1.04/.95
280	25/1/2/5/2/1/1.04/.95
281	25/2/1/5/2/1/1.04/.95
282	25/3/1/5/2/6/1.04/.95
283	25/3/2/5/2/10/1.04/.95
284	25/5/1/3/1.5/4/1.04/.95
285	25/5/2/3/2/1/1.04/.95
286	25/6/1/4/2/2/1.04/.95
287	25/6/2/4/2/2/1.04/.95
288	25/7/1/4/2/6/1.04/.95
289	25/7/2/3.5/1.5/3/1.04/.95
290	25/7/3/4/2/1/1.04/.95

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LINE #	-----
291	25/9/1/4/2/3/1.04/.95
292	25/11/1/4/2/4/1.04/.95
293	25/11/2/4/2/4/1.04/.95
294	25/12/1/4/2/1/1.04/.95
295	25/12/2/4/2/3/1.04/.95
296	25/13/1/5/1.5/1/1.04/.95
297	25/13/2/5/1.5/2/1.04/.95
298	25/13/3/5/1.5/1/1.04/.95
299	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/CBADHTG/OFF/CBADP&L/OFF
300	27/1/////1.8/WATT-SF/ASHRAE2
301	27/2/////2.1/WATT-SF/ASHRAE2
302	27/3/5/PEOPLE/255/255/3.1/WATT-SF/ASHRAE2
303	27/4/1/PEOPLE/255/255/2.7/WATT-SF/ASHRAE2
304	27/6/1/PEOPLE/255/255/2.7/WATT-SF/ASHRAE2
305	27/7/3/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
306	27/8/////3.8/WATT-SF/ASHRAE2
307	27/9/1/PEOPLE/255/255/4.0/WATT-SF/ASHRAE2
308	27/10/////2.6/WATT-SF/ASHRAE2
309	27/11/1/PEOPLE/255/255/2.2/WATT-SF/ASHRAE2
310	27/12/1/PEOPLE/255/255/2.0/WATT-SF/ASHRAE2
311	27/13/4/PEOPLE/255/255/1.3/WATT-SF/ASHRAE2
312	28/3/1/PC'S/1.4/WATT-SF/CBADP&L
313	28/4/1/PC'S/1/WATT-SF/CBADP&L
314	28/7/1/PC'S/1/WATT-SF/CBADP&L
315	28/8/1/COPIER/4/WATT-SF/CBADP&L
316	28/9/1/PC'S/1/WATT-SF/CBADP&L
317	28/13/1/PC'S/6.8/WATT-SF/CBADP&L
318	29/M/////.26/CFM-SF/.26/CFM-SF
319	30/1/136/CFM/////////136/CFM
320	30/2/136/CFM/////////136/CFM
321	30/3/1350/CFM
322	30/4/150/CFM
323	30/5/200/CFM
324	30/6/500/CFM
325	30/7/720/CFM
326	30/8/240/CFM
327	30/9/120/CFM
328	30/10/125/CFM
329	30/11/380/CFM
330	30/12/125/CFM
331	30/13/1460/CFM/1460/CFM
332	SYSTEM - 3
333	39/3/REPLACE FLUORESCENT LAMPS
334	40/1/SZ
335	41/1/1/2
336	42/1/.5/////1
337	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
338	40/2/RAD
339	41/2/1/2
340	42/2
341	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
342	40/3/COMP
343	41/3/3/3
344	42/3/.2/.2
345	45/3/CBADCLG/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
346	EQUIPMENT - 3
347	59/3/CARLISLE///REPLACE FLUORESCENT LAMPS
348	60/1/1/BLKPLANT/1/1

CONTENTS OF : E:\CB330.TM

LINE #	-----
349	60/2/2/BLKPLANT/3/3
350	62/1/EQ1161/2/60/MBH
351	62/2/EQ1161/2/24/MBH
352	65/1/1//2/2
353	67/1/EQ2102/1/18/FT-WATER/120/MBH
354	69/1/EQ4003
355	69/3/EQ4003/EQ4003
356	LOAD - 4
357	19/4/REPLACE FLUORESCENT BALLASTS
358	20/1/1/MEN/105/1//0//10.3
359	20/2/1/WOMEN/87/1//0//10.3
360	20/3/1/ENGR RESOURCES/1062/1//0//10.3
361	20/4/1/OFFICE/135/1//0//10.3
362	20/5/1/ENTRANCE/120/1//0//10.3
363	20/6/2/PRINT ROOM/169/1//0//10.3
364	20/7/2/ENGINEERING/657/1//0//10.3
365	20/8/2/HALL/194/1//0//10.3
366	20/9/2/OFFICE/140/1//0//10.3
367	20/10/2/RECEPTION/105/1//0//10.3
368	20/11/2/OFFICE/293/1//0//10.3
369	20/12/2/SECRETARY/91/1//0//10.3
370	20/13/3/COMPUTER ROOM/361/1//0//10.5
371	21/M////CBADCTX///CBADHTX
372	22/M/1/YES////163
373	22/13/1/YES////163
374	24/1/1/11.75/9//164/180
375	24/1/2/9/9//164/270
376	24/2/1/12/9//164/180
377	24/3/1/22/9//164/90
378	24/3/2/49/9//164/270
379	24/5/1/18/9//165/90
380	24/5/2/7/9//165/180
381	24/6/1/12.5/9//165/0
382	24/6/2/13.5/9//165/270
383	24/7/1/25/9//165/0
384	24/7/2/26/9//165/180
385	24/7/3/10.5/9//165/270
386	24/9/1/15.5/9//165/0
387	24/11/1/18/9//165/0
388	24/11/2/16.5/9//165/90
389	24/12/1/8/9//165/90
390	24/12/2/12/9//165/180
391	24/13/1/19/9.75//166/0
392	24/13/2/19/9.75//166/90
393	24/13/3/19/9.75//166/180
394	25/1/1/5/2/1/1.04/.95
395	25/1/2/5/2/1/1.04/.95
396	25/2/1/5/2/1/1.04/.95
397	25/3/1/5/2/6/1.04/.95
398	25/3/2/5/2/10/1.04/.95
399	25/5/1/3/1.5/4/1.04/.95
400	25/5/2/3/2/1/1.04/.95
401	25/6/1/4/2/2/1.04/.95
402	25/6/2/4/2/2/1.04/.95
403	25/7/1/4/2/6/1.04/.95
404	25/7/2/3.5/1.5/3/1.04/.95
405	25/7/3/4/2/1/1.04/.95
406	25/9/1/4/2/3/1.04/.95

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LINE #	-----
407	25/11/1/4/2/4/1.04/.95
408	25/11/2/4/2/4/1.04/.95
409	25/12/1/4/2/1/1.04/.95
410	25/12/2/4/2/3/1.04/.95
411	25/13/1/5/1.5/1/1.04/.95
412	25/13/2/5/1.5/2/1.04/.95
413	25/13/3/5/1.5/1/1.04/.95
414	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/CBADHTG/OFF/CBADP&L/OFF
415	27/1/////1.5/WATT-SF/ASHRAE2
416	27/2/////1.8/WATT-SF/ASHRAE2
417	27/3/5/PEOPLE/255/255/2.6/WATT-SF/ASHRAE2
418	27/4/1/PEOPLE/255/255/2.3/WATT-SF/ASHRAE2
419	27/6/1/PEOPLE/255/255/2.3/WATT-SF/ASHRAE2
420	27/7/3/PEOPLE/255/255/2.4/WATT-SF/ASHRAE2
421	27/8/////3.2/WATT-SF/ASHRAE2
422	27/9/1/PEOPLE/255/255/3.4/WATT-SF/ASHRAE2
423	27/10/////2.2/WATT-SF/ASHRAE2
424	27/11/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
425	27/12/1/PEOPLE/255/255/1.7/WATT-SF/ASHRAE2
426	27/13/4/PEOPLE/255/255/1.1/WATT-SF/ASHRAE2
427	28/3/1/PC'S/1.4/WATT-SF/CBADP&L
428	28/4/1/PC'S/1/WATT-SF/CBADP&L
429	28/7/1/PC'S/1/WATT-SF/CBADP&L
430	28/8/1/COPIER/4/WATT-SF/CBADP&L
431	28/9/1/PC'S/1/WATT-SF/CBADP&L
432	28/13/1/PC'S/6.8/WATT-SF/CBADP&L
433	29/M/////.26/CFM-SF/.26/CFM-SF
434	30/1/136/CFM////////136/CFM
435	30/2/136/CFM////////136/CFM
436	30/3/1350/CFM
437	30/4/150/CFM
438	30/5/200/CFM
439	30/6/500/CFM
440	30/7/720/CFM
441	30/8/240/CFM
442	30/9/120/CFM
443	30/10/125/CFM
444	30/11/380/CFM
445	30/12/125/CFM
446	30/13/1460/CFM/1460/CFM
447	SYSTEM - 4
448	39/4/REPLACE FLUORESCENT BALLASTS
449	40/1/SZ
450	41/1/1/2
451	42/1/.5////.1
452	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
453	40/2/RAD
454	41/2/1/2
455	42/2
456	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
457	40/3/COMP
458	41/3/3/3
459	42/3/.2/.2
460	45/3/CBADCLG/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
461	EQUIPMENT - 4
462	59/4/CARLISLE///REPLACE FLUORESCENT BALLASTS
463	60/1/1/BLKPLANT/1/1
464	60/2/2/BLKPLANT/3/3



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LINE #	-----
465	62/1/EQ1161/2/60/MBH
466	62/2/EQ1161/2/24/MBH
467	65/1/1//2/2
468	67/1/EQ2102/1/18/FT-WATER/120/MBH
469	69/1/EQ4003
470	69/3/EQ4003/EQ4003

CONTENTS OF : E:\CB3308.TM

LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 330

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/REPLACE FLUORESCENT FIXTURES

13 20/1/1/MEN/105/1//0//10.3

14 20/2/1/WOMEN/87/1//0//10.3

15 20/3/1/ENGR RESOURCES/1062/1//0//10.3

16 20/4/1/OFFICE/135/1//0//10.3

17 20/5/1/ENTRANCE/120/1//0//10.3

18 20/6/2/PRINT ROOM/169/1//0//10.3

19 20/7/2/ENGINEERING/657/1//0//10.3

20 20/8/2/HALL/194/1//0//10.3

21 20/9/2/OFFICE/140/1//0//10.3

22 20/10/2/RECEPTION/105/1//0//10.3

23 20/11/2/OFFICE/293/1//0//10.3

24 20/12/2/SECRETARY/91/1//0//10.3

25 20/13/3/COMPUTER ROOM/361/1//0//10.5

26 21/M////CBADCTX///CBADHTX

27 22/M/1/YES////163

28 22/13/1/YES////163

29 24/1/1/11.75/9//164/180

30 24/1/2/9/9//164/270

31 24/2/1/12/9//164/180

32 24/3/1/22/9//164/90

33 24/3/2/49/9//164/270

34 24/5/1/18/9//165/90

35 24/5/2/7/9//165/180

36 24/6/1/12.5/9//165/0

37 24/6/2/13.5/9//165/270

38 24/7/1/25/9//165/0

39 24/7/2/26/9//165/180

40 24/7/3/10.5/9//165/270

41 24/9/1/15.5/9//165/0

42 24/11/1/18/9//165/0

43 24/11/2/16.5/9//165/90

44 24/12/1/8/9//165/90

45 24/12/2/12/9//165/180

46 24/13/1/19/9.75//166/0

47 24/13/2/19/9.75//166/90

48 24/13/3/19/9.75//166/180

49 25/1/1/5/2/1/1.04/.95

50 25/1/2/5/2/1/1.04/.95

51 25/2/1/5/2/1/1.04/.95

52 25/3/1/5/2/6/1.04/.95

53 25/3/2/5/2/10/1.04/.95

54 25/5/1/3/1.5/4/1.04/.95

55 25/5/2/3/2/1/1.04/.95

56 25/6/1/4/2/2/1.04/.95

57 25/6/2/4/2/2/1.04/.95

58 25/7/1/4/2/6/1.04/.95

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LINE #	
59	25/7/2/3.5/1.5/3/1.04/.95
60	25/7/3/4/2/1/1.04/.95
61	25/9/1/4/2/3/1.04/.95
62	25/11/1/4/2/4/1.04/.95
63	25/11/2/4/2/4/1.04/.95
64	25/12/1/4/2/1/1.04/.95
65	25/12/2/4/2/3/1.04/.95
66	25/13/1/5/1.5/1/1.04/.95
67	25/13/2/5/1.5/2/1.04/.95
68	25/13/3/5/1.5/1/1.04/.95
69	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/CBADHTG/OFF/CBADP&L/OFF
70	27/1/////1.2/WATT-SF/ASHRAE2
71	27/2/////1.5/WATT-SF/ASHRAE2
72	27/3/5/PEOPLE/255/255/2.2/WATT-SF/ASHRAE2
73	27/4/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
74	27/6/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
75	27/7/3/PEOPLE/255/255/2.0/WATT-SF/ASHRAE2
76	27/8/////2.7/WATT-SF/ASHRAE2
77	27/9/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
78	27/10/////1.9/WATT-SF/ASHRAE2
79	27/11/1/PEOPLE/255/255/1.5/WATT-SF/ASHRAE2
80	27/12/1/PEOPLE/255/255/1.4/WATT-SF/ASHRAE2
81	27/13/4/PEOPLE/255/255/0.9/WATT-SF/ASHRAE2
82	28/3/1/PC'S/1.4/WATT-SF/CBADP&L
83	28/4/1/PC'S/1/WATT-SF/CBADP&L
84	28/7/1/PC'S/1/WATT-SF/CBADP&L
85	28/8/1/COPIER/4/WATT-SF/CBADP&L
86	28/9/1/PC'S/1/WATT-SF/CBADP&L
87	28/13/1/PC'S/6.8/WATT-SF/CBADP&L
88	29/M/////.26/CFM-SF/.26/CFM-SF
89	30/1/136/CFM/////////136/CFM
90	30/2/136/CFM/////////136/CFM
91	30/3/1350/CFM
92	30/4/150/CFM
93	30/5/200/CFM
94	30/6/500/CFM
95	30/7/720/CFM
96	30/8/240/CFM
97	30/9/120/CFM
98	30/10/125/CFM
99	30/11/380/CFM
100	30/12/125/CFM
101	30/13/1460/CFM/1460/CFM
102	SYSTEM - 1
103	39/1/REPLACE FLUORESCENT FIXTURES
104	40/1/SZ
105	41/1/1/2
106	42/1/.5////////.1
107	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
108	40/2/RAD
109	41/2/1/2
110	42/2
111	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
112	40/3/COMP
113	41/3/3/3
114	42/3/.2/.2
115	45/3/CBADCLG/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
116	EQUIPMENT - 1

CONTENTS OF : E:\CB330B.TM

LINE #	-----
117	59/1/CARLISLE///REPLACE FLUORESCENT FIXTURES
118	60/1/1/BLKPLANT/1/1
119	60/2/2/BLKPLANT/3/3
120	62/1/EQ1161/2/60/MBH
121	62/2/EQ1161/2/24/MBH
122	65/1/1//2/2
123	67/1/EQ2102/1/18/FT-WATER/120/MBH
124	69/1/EQ4003
125	69/3/EQ4003/EQ4003
126	LOAD - 2
127	19/2/COMBINED ECOS
128	20/1/1/MEN/105/1//0//10.3
129	20/2/1/WOMEN/87/1//0//10.3
130	20/3/1/ENGR RESOURCES/1062/1//0//10.3
131	20/4/1/OFFICE/135/1//0//10.3
132	20/5/1/ENTRANCE/120/1//0//10.3
133	20/6/2/PRINT ROOM/169/1//0//10.3
134	20/7/2/ENGINEERING/657/1//0//10.3
135	20/8/2/HALL/194/1//0//10.3
136	20/9/2/OFFICE/140/1//0//10.3
137	20/10/2/RECEPTION/105/1//0//10.3
138	20/11/2/OFFICE/293/1//0//10.3
139	20/12/2/SECRETARY/91/1//0//10.3
140	20/13/3/COMPUTER ROOM/361/1//0//10.5
141	21/M///CBADCTX///CBADHTX
142	22/M/1/YES///163
143	22/13/1/YES///163
144	24/1/1/11.75/9//164/180
145	24/1/2/9/9//164/270
146	24/2/1/12/9//164/180
147	24/3/1/22/9//164/90
148	24/3/2/49/9//164/270
149	24/5/1/18/9//165/90
150	24/5/2/7/9//165/180
151	24/6/1/12.5/9//165/0
152	24/6/2/13.5/9//165/270
153	24/7/1/25/9//165/0
154	24/7/2/26/9//165/180
155	24/7/3/10.5/9//165/270
156	24/9/1/15.5/9//165/0
157	24/11/1/18/9//165/0
158	24/11/2/16.5/9//165/90
159	24/12/1/8/9//165/90
160	24/12/2/12/9//165/180
161	24/13/1/19/9.75//166/0
162	24/13/2/19/9.75//166/90
163	24/13/3/19/9.75//166/180
164	25/1/1/5/2/1/1.04/.95
165	25/1/2/5/2/1/1.04/.95
166	25/2/1/5/2/1/1.04/.95
167	25/3/1/5/2/6/1.04/.95
168	25/3/2/5/2/10/1.04/.95
169	25/5/1/3/1.5/4/1.04/.95
170	25/5/2/3/2/1/1.04/.95
171	25/6/1/4/2/2/1.04/.95
172	25/6/2/4/2/2/1.04/.95
173	25/7/1/4/2/6/1.04/.95
174	25/7/2/3.5/1.5/3/1.04/.95

CONTENTS OF : E:\CB330B.TM

LINE #	
175	25/7/3/4/2/1/1.04/.95
176	25/9/1/4/2/3/1.04/.95
177	25/11/1/4/2/4/1.04/.95
178	25/11/2/4/2/4/1.04/.95
179	25/12/1/4/2/1/1.04/.95
180	25/12/2/4/2/3/1.04/.95
181	25/13/1/5/1.5/1/1.04/.95
182	25/13/2/5/1.5/2/1.04/.95
183	25/13/3/5/1.5/1/1.04/.95
184	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/CBADHTG/OFF/CBADP&L/OFF
185	27/1/////1.2/WATT-SF/ASHRAE2
186	27/2/////1.5/WATT-SF/ASHRAE2
187	27/3/5/PEOPLE/255/255/2.2/WATT-SF/ASHRAE2
188	27/4/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
189	27/6/1/PEOPLE/255/255/1.9/WATT-SF/ASHRAE2
190	27/7/3/PEOPLE/255/255/2.0/WATT-SF/ASHRAE2
191	27/8/////2.7/WATT-SF/ASHRAE2
192	27/9/1/PEOPLE/255/255/2.8/WATT-SF/ASHRAE2
193	27/10/////1.9/WATT-SF/ASHRAE2
194	27/11/1/PEOPLE/255/255/1.5/WATT-SF/ASHRAE2
195	27/12/1/PEOPLE/255/255/1.4/WATT-SF/ASHRAE2
196	27/13/4/PEOPLE/255/255/0.9/WATT-SF/ASHRAE2
197	28/3/1/PC'S/1.4/WATT-SF/CBADP&L
198	28/4/1/PC'S/1/WATT-SF/CBADP&L
199	28/7/1/PC'S/1/WATT-SF/CBADP&L
200	28/8/1/COPIER/4/WATT-SF/CBADP&L
201	28/9/1/PC'S/1/WATT-SF/CBADP&L
202	28/13/1/PC'S/6.8/WATT-SF/CBADP&L
203	29/M/////1.19/CFM-SF/.19/CFM-SF
204	30/1/136/CFM////////136/CFM
205	30/2/136/CFM////////136/CFM
206	30/3/1350/CFM
207	30/4/150/CFM
208	30/5/200/CFM
209	30/6/500/CFM
210	30/7/720/CFM
211	30/8/240/CFM
212	30/9/120/CFM
213	30/10/125/CFM
214	30/11/380/CFM
215	30/12/125/CFM
216	30/13/1460/CFM/1460/CFM
217	SYSTEM - 2
218	39/2/COMBINED ECOS
219	40/1/SZ
220	41/1/1/2
221	42/1/.5/////1
222	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
223	40/2/RAD
224	41/2/1/2
225	42/2
226	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
227	40/3/COMP
228	41/3/3/3
229	42/3/.2/.2
230	45/3/CBADCLG/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
231	EQUIPMENT - 2
232	59/2/CARLISLE///COMBINED ECOS

CONTENTS OF : E:\CB330B.TM

LINE #	-----
233	60/1/1/BLKPLANT/1/1
234	60/2/2/BLKPLANT/3/3
235	62/1/EQ1161/2/60/MBH
236	62/2/EQ1161/2/24/MBH
237	65/1/1//2/2
238	67/1/EQ2102/1/18/FT-WATER/120/MBH
239	69/1/EQ4003
240	69/3/EQ4003/EQ4003

*Building 330*  
*Trace Output File*

933702

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*****  
*****  
**  
**          T R A C E    6 0 0    A N A L Y S I S          **  
**  
**          by          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 330

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 10: 0:19 12/27/93  
Dataset Name: CB330 .TM



AIRFLOW - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply	Room Exhaust
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Airflow (Cfm)	Airflow (Cfm)
1	SZ	0	4,182	4,196	4,866	670	0	272
2	RAD	0	0	0	0	670	0	0
3	COMP	0	1,460	1,460	1,604	144	0	0
Totals		0	5,642	5,656	6,470	1,484	0	272

CAPACITY - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	SZ	7.7	0.0	0.0	7.7	-260,273	0	0	0	0	0	-260,273
2	RAD	0.0	0.0	0.0	0.0	-122,302	0	0	0	0	0	-122,302
3	COMP	1.7	0.0	0.0	1.7	-20,814	0	0	-5,720	0	0	-20,814
Totals		9.4	0.0	0.0	9.4	-403,389	0	0	-5,720	0	0	-403,389

The building peaked at hour 16 month 7 with a capacity of 9.1 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.32	539.7	407.6	29.44	1.33	-82.42	3,158
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-38.73	3,158
3	Main	COMP	0.00	4.04	870.8	215.3	55.73	4.04	-57.66	361

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	31.17	*	30,911	41.52	*	0	0	0.00
Glass Cond	5,602	0		5,602	6.03	*	5,256	7.06	*	-30,411	-30,411	11.68
Wall Cond	23,116	0		23,116	24.86	*	23,168	31.12	*	-45,240	-45,240	17.38
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	25,084			25,084	26.98	*	9,717	13.05	*	-46,651	-46,651	17.92
Sub Total==>	82,785	0		82,785	89.03	*	69,051	92.75	*	-122,302	-122,302	46.99
Internal Loads												
Lights	28,215	0		28,215	30.34	*	28,221	37.91	*	0	0	0.00
People	6,217			6,217	6.69	*	2,902	3.90	*	0	0	0.00
Misc	9,778	0	0	9,778	10.52	*	9,778	13.13	*	0	0	0.00
Sub Total==>	44,210	0	0	44,210	47.55	*	40,901	54.94	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.60	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-35,500			-35,500	-38.18	*	-35,500	-47.68	*	-137,970	-137,970	53.01
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	91,495	0	0	92,982	100.00	*	74,453	100.00	*	-260,272	-260,272	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	7.7	93.0	74.9	4,182 75.0 62.4 66.5	58.3 54.9 60.6	3,158		
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0		
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	7.7	93.0				2,576	438	17

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	1.32	SADB	58.6	125.0
Main Htg	-260.3	4,196	68.0	125.0	Infil	670	670	Clg Cfm/Ton	539.72	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,196	Clg Sqft/Ton	407.56	Return	75.0	68.0
Preheat	-0.0	4,182	68.0	58.3	Mincfm	0	0	Clg Btuh/Sqft	29.44	Ret/OA	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	3,987	4,196	No. People	13	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	Htg Cfm/Sqft	1.33	Fn BldTD	0.1	0.0
Total	-260.3				Auxil	0	0	Htg Btuh/Sqft	-82.42	Fn Frict	0.2	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Percent		Space	Percent		Space Peak	Coil Peak	Percent
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	24.87
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	36.99
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,651	-46,651	38.14
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-122,302	-122,302	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-122,302	-122,302	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0 0 0
Totals	0.0	0.0									Wall	2,576 438 17

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg % OA	0.0	Type	Clg	Htg
Main Htg	-122.3	0	0.0	0.0	Infil	0	670	Clg Cfm/Sqft	0.00	SAOB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-122.3				Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/SqFt	-38.73	Fn Frict	0.0	0.0

System 3 Peak COMP - COMPUTER ROOM UNIT

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0	0	836	4.15	*	1,050	6.24	*	-904	-904	5.99
Glass Solar	1,800	0	0	1,800	8.95	*	1,500	8.91	*	0	0	0.00
Glass Cond	406	0	0	406	2.02	*	437	2.59	*	-2,084	-2,084	13.81
Wall Cond	1,152	0	0	1,152	5.73	*	1,085	6.45	*	-2,043	-2,043	13.54
Partition	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	4,926	0	0	4,926	24.48	*	2,437	14.47	*	-10,063	-10,063	66.67
Sub Total==>	9,120	0	0	9,120	45.33	*	6,510	38.65	*	-15,094	-15,094	100.00
Internal Loads												
Lights	1,617	0	0	1,617	8.03	*	1,695	10.07	*	0	0	0.00
People	1,887	0	0	1,887	9.38	*	928	5.51	*	0	0	0.00
Misc	7,289	0	0	7,289	36.23	*	7,708	45.77	*	0	0	0.00
Sub Total==>	10,793	0	0	10,793	53.64	*	10,332	61.35	*	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat	0	0	0	208	1.03	*	0	0.00	*	0	0	0.00
Ret. Fan Heat	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Duct Heat Pkup	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Terminal Bypass	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Grand Total==>	19,913	0	0	20,120	100.00	*	16,841	100.00	*	-15,094	-15,094	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	1.7	20.1	1,460	75.0 65.1 79.5	64.3 60.9 76.5	Part	361	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	361	0 0
Totals	1.7	20.1				Wall	556	30 5

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	4.04	SADB	64.4	77.5
Main Htg	-20.8	1,460	64.4	77.5	Infil	144	144	Clg Cfm/Ton	870.77	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Sqft/Ton	215.31	Return	75.0	68.0
Preheat	-0.0	1,460	68.0	64.3	Mincfm	0	1,460	Clg Btuh/Sqft	55.73	Ret/OA	75.0	68.0
Reheat	-5.7	1,460	64.4	68.0	Return	1,460	1,460	No. People	4	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	4.04	Fn BldTD	0.0	0.0
Total	-20.8				Auxil	0	0	Htg Btuh/Sqft	-57.66	Fn Frict	0.1	0.1

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87

BUILDING AREAS - ALTERNATIVE 1  
BASE BUILDING

B U I L D I N G   A R E A S													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.				361	0	0	0	0	361	30	5	526
System	3 Total/Ave.				361	0	0	0	0	361	30	5	526
Building					6,677	0	0	0	0	361	905	16	4,803

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ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
BASE BUILDING

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 2.14 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.5	0	4	-20,455	38	797	282.8	0	0	0.0	0	0
5 - 10	0.9	0	0	-40,911	38	798	565.6	0	0	0.0	0	0
10 - 15	1.4	6	58	-61,366	9	200	848.4	0	0	0.0	0	0
15 - 20	1.9	4	42	-81,822	4	84	1,131.2	0	0	0.0	0	0
20 - 25	2.4	6	60	-102,277	3	57	1,414.0	0	0	0.0	0	0
25 - 30	2.8	2	18	-122,733	9	187	1,696.8	0	0	0.0	0	0
30 - 35	3.3	2	16	-143,188	0	0	1,979.6	0	0	0.0	0	0
35 - 40	3.8	4	42	-163,644	0	0	2,262.4	0	0	0.0	0	0
40 - 45	4.2	4	45	-184,099	0	0	2,545.2	0	0	0.0	0	0
45 - 50	4.7	2	22	-204,555	0	0	2,828.0	0	0	0.0	0	0
50 - 55	5.2	5	52	-225,010	0	0	3,110.8	0	0	0.0	0	0
55 - 60	5.7	7	76	-245,465	0	0	3,393.6	0	0	0.0	0	0
60 - 65	6.1	9	91	-265,921	0	0	3,676.4	0	0	0.0	0	0
65 - 70	6.6	10	101	-286,376	0	0	3,959.2	0	0	0.0	0	0
70 - 75	7.1	10	109	-306,832	0	0	4,242.0	0	0	0.0	0	0
75 - 80	7.5	6	64	-327,287	0	0	4,524.8	0	0	0.0	0	0
80 - 85	8.0	8	89	-347,743	0	0	4,807.6	0	0	0.0	0	0
85 - 90	8.5	6	66	-368,198	0	0	5,090.4	0	0	0.0	0	0
90 - 95	9.0	0	0	-388,654	0	0	5,373.2	0	0	0.0	0	0
95 - 100	9.4	9	95	-409,109	0	0	5,656.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,710	0	0	6,637	0.0	0	7,690	0.0	0	8,760



BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
 BASE BUILDING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----				
Range	1	2	1	2	3
(F)					

Max. Temp.	89.1	90.7	111.0	117.1	94.9
Mo./Hr.	7 20	7 21	7 19	7 19	10 17
Day Type	4	1	2	1	1

	..... Number of Hours .....				
Above 100	0	0	2,202	1,176	0
95 - 100	0	0	467	778	0
90 - 95	0	0	463	545	85
85 - 90	467	264	557	577	546
80 - 85	1,475	1,212	391	376	1,522
75 - 80	2,150	1,823	160	529	1,963
70 - 75	379	784	597	645	867
65 - 70	925	601	1,968	1,378	653
60 - 65	436	714	831	640	683
55 - 60	1,441	644	442	725	716
50 - 55	460	906	682	1,391	540
Below 50	1,027	1,812	0	0	1,185

Min. Temp.	39.2	30.4	55.0	55.0	30.6
Mo./Hr.	2 7	2 9	1 12	1 5	2 9
Day Type	5	4	3	1	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	3,949	20	208	1
Feb	3,575	20	199	1
March	4,308	20	78	1
April	3,738	20	19	1
May	5,368	32	0	0
June	6,223	32	0	0
July	6,328	32	0	0
Aug	6,655	32	0	0
Sept	4,970	32	0	0
Oct	4,111	20	14	1
Nov	3,744	20	51	1
Dec	3,759	20	162	1
Total	56,730	32	731	1

Building Energy Consumption = 39,948 (Btu/Sq Ft/Year)  
Source Energy Consumption = 101,602 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION -----

Ref	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	3923	3549	4297	3736	4110	4110	3736	4297	3736	4110	3736	3736	47,075
	PK	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	724	1414	1768	1592	724	0	0	0	6,223
	PK	0.0	0.0	0.0	0.0	6.4	6.7	6.9	6.7	6.5	0.0	0.0	0.0	6.9
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	64	127	176	146	67	0	0	0	580
	PK	0.0	0.0	0.0	0.0	0.6	0.7	0.7	0.7	0.6	0.0	0.0	0.0	0.7
1	EQ5303	CONTROLS												
	ELEC	0	0	0	0	69	74	89	83	64	0	0	0	378
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
2	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	140	217	292	240	140	0	0	0	1,029
	PK	0.0	0.0	0.0	0.0	2.6	2.7	2.8	2.7	2.6	0.0	0.0	0.0	2.8
2	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	13	20	29	23	13	0	0	0	98
	PK	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.2
2	EQ5303	CONTROLS												

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
BASE BUILDING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 32.5 (kW)  
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	24.28
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	10.11

Sub Total			11.2	34.39
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	2.76
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Sub Total			0.9	2.76
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Sub Total			0.0	0.00
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Miscellaneous

Lights			20.4	62.85
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			20.4	62.85

Grand Total			32.5	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 330

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 10:17:27 12/27/93  
Dataset Name: CB330 .TM

AIRFLOW - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	SZ	0	4,182	4,182	4,671	489	0	272
2	RAD	0	0	0	0	489	0	0
3	COMP	0	1,460	1,460	1,566	106	0	0
Totals		0	5,642	5,642	6,237	1,085	0	272

CAPACITY - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

		----- Cooling -----				----- Heating -----						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
System	System	Capacity	Capacity	Capacity	Totals	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Totals
Number	Type	(Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)
1	SZ	7.1	0.0	0.0	7.1	-245,626	0	0	0	0	0	-245,626
2	RAD	0.0	0.0	0.0	0.0	-109,743	0	0	0	0	0	-109,743
3	COMP	1.6	0.0	0.0	1.6	-17,449	0	0	-5,064	0	0	-17,449
Totals		8.7	0.0	0.0	8.7	-372,817	0	0	-5,064	0	0	-372,817

The building peaked at hour 16 month 7 with a capacity of 8.4 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.32	590.0	445.5	26.93	1.32	-77.78	3,158
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-34.75	3,158
3	Main	COMP	0.00	4.04	932.9	230.7	52.02	4.04	-48.33	361

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Percnt		Space	Percnt		Space Peak	Coil Peak	Percnt
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	34.07	*	30,911	43.74	*	0	0	0.00
Glass Cond	5,602	0		5,602	6.59	*	5,256	7.44	*	-30,411	-30,411	12.38
Wall Cond	23,116	0		23,116	27.18	*	23,168	32.79	*	-45,240	-45,240	18.42
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	18,330			18,330	21.55	*	7,101	10.05	*	-34,091	-34,091	13.88
Sub Total==>	76,032	0		76,032	89.39	*	66,435	94.01	*	-109,742	-109,742	44.68
Internal Loads												
Lights	28,215	0		28,215	33.17	*	28,221	39.94	*	0	0	0.00
People	6,217			6,217	7.31	*	2,902	4.11	*	0	0	0.00
Misc	9,778	0	0	9,778	11.50	*	9,778	13.84	*	0	0	0.00
Sub Total==>	44,210	0	0	44,210	51.98	*	40,901	57.88	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.75	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-36,672			-36,672	-43.11	*	-36,672	-51.90	*	-135,884	-135,884	55.32
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	83,570	0	0	85,057	100.00	*	70,665	100.00	*	-245,626	-245,626	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor	3,158	
Main Clg	7.1	85.1	70.9	4,182 75.0 62.4 66.5	59.1 55.6 62.0	Part	0	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Roof	0	0 0
Totals	7.1	85.1				Wall	2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	1.32	SADB	59.5	122.0
Main Htg	-245.6	4,182	68.0	122.0	Infil	489	489	Clg Cfm/Ton	590.01	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,182	Clg Sqft/Ton	445.54	Return	75.0	68.0
Preheat	-0.0	4,182	68.0	59.1	Mincfm	0	0	Clg Btuh/Sqft	26.93	Ret/OA	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	3,966	4,182	No. People	13	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	Htg Cfm/Sqft	1.32	Fn BldTD	0.1	0.0
Total	-245.6				Auxil	0	0	Htg Btuh/Sqft	-77.78	Fn Frict	0.2	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----



System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	27.71
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	41.22
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-34,091	-34,091	31.06
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-109,742	-109,742	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-109,742	-109,742	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	3,158	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	0	0 0
Totals	0.0	0.0								Wall	2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
								Clg % OA	0.0	Type	Clg	Htg
Main Htg	-109.7	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SAOB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	489	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-109.7				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-34.75	Fn Frict	0.0	0.0

System 3 Peak COMP - COMPUTER ROOM UNIT

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0		836	4.45	*	1,050	6.49	*	-904	-904	7.30
Glass Solar	1,800	0		1,800	9.59	*	1,500	9.27	*	0	0	0.00
Glass Cond	406	0		406	2.16	*	437	2.70	*	-2,084	-2,084	16.83
Wall Cond	1,152	0		1,152	6.14	*	1,085	6.71	*	-2,043	-2,043	16.50
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	3,585			3,585	19.09	*	1,781	11.00	*	-7,354	-7,354	59.38
Sub Total==>	7,779	0		7,779	41.42	*	5,854	36.17	*	-12,385	-12,385	100.00
Internal Loads												
Lights	1,617	0		1,617	8.61	*	1,695	10.47	*	0	0	0.00
People	1,887			1,887	10.05	*	928	5.73	*	0	0	0.00
Misc	7,289	0	0	7,289	38.81	*	7,708	47.62	*	0	0	0.00
Sub Total==>	10,793	0	0	10,793	57.47	*	10,332	63.83	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	1.11	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	18,572	0	0	18,779	100.00	*	16,185	100.00	*	-12,385	-12,385	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	1.6	18.8	1,460	75.0	65.1	79.6	64.7	61.2	77.3	Part	0	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	361	0 0
Totals	1.6	18.8								Wall	556	30 5

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	ENGINEERING CHECKS--		TEMPERATURES (F)---		
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg % OA		Type	Clg	Htg
Main Htg	-17.4	1,460	64.8	75.8	Infil	106	106	Clg Cfm/Sqft	4.04	SADB	64.8	75.8
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Cfm/Ton	932.95	Plenum	75.0	68.0
Preheat	-0.0	1,460	68.0	64.7	Mincfm	0	1,460	Clg Sqft/Ton	230.68	Return	75.0	68.0
Reheat	-5.1	1,460	64.8	68.0	Return	1,460	1,460	Clg Btuh/Sqft	52.02	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	4	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-17.4				Auxil	0	0	Htg Cfm/Sqft	4.04	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-48.33	Fn Frict	0.1	0.1

BUILDING U-VALUES - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- B U I L D I N G U - V A L U E S -----												
Room Number	Description	Room U-Values (Btu/hr/sqft/F)								Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)	
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone 2	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System 1	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone 2	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System 2	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87

BUILDING AREAS - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.				361	0	0	0	0	361	30	5	526
System	3 Total/Ave.				361	0	0	0	0	361	30	5	526
Building					6,677	0	0	0	0	361	905	16	4,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTvr) = 2.14 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTvw) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.4	0	0	-18,894	40	740	282.1	0	0	0.0	0	0
5 - 10	0.9	1	12	-37,788	34	624	564.2	0	0	0.0	0	0
10 - 15	1.3	1	12	-56,682	10	186	846.3	0	0	0.0	0	0
15 - 20	1.7	1	16	-75,576	5	85	1,128.4	0	0	0.0	0	0
20 - 25	2.2	6	60	-94,470	2	33	1,410.5	0	0	0.0	0	0
25 - 30	2.6	1	12	-113,364	10	180	1,692.6	0	0	0.0	0	0
30 - 35	3.0	4	38	-132,258	0	0	1,974.7	0	0	0.0	0	0
35 - 40	3.5	7	70	-151,152	0	0	2,256.8	0	0	0.0	0	0
40 - 45	3.9	4	40	-170,046	0	0	2,538.9	0	0	0.0	0	0
45 - 50	4.3	0	4	-188,941	0	0	2,821.0	0	0	0.0	0	0
50 - 55	4.8	2	22	-207,835	0	0	3,103.1	0	0	0.0	0	0
55 - 60	5.2	6	60	-226,729	0	0	3,385.2	0	0	0.0	0	0
60 - 65	5.6	8	87	-245,623	0	0	3,667.3	0	0	0.0	0	0
65 - 70	6.1	4	44	-264,517	0	0	3,949.4	0	0	0.0	0	0
70 - 75	6.5	16	175	-283,411	0	0	4,231.5	0	0	0.0	0	0
75 - 80	6.9	6	63	-302,305	0	0	4,513.6	0	0	0.0	0	0
80 - 85	7.4	7	80	-321,199	0	0	4,795.7	0	0	0.0	0	0
85 - 90	7.8	9	98	-340,093	0	0	5,077.8	0	0	0.0	0	0
90 - 95	8.2	3	31	-358,987	0	0	5,359.9	0	0	0.0	0	0
95 - 100	8.7	14	146	-377,881	0	0	5,642.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,690	0	0	6,912	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
 WEATHERSTRIP & CAULKING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----				
Range	1	2	1	2	3
(F)					

Max. Temp.	90.2	91.3	111.0	117.1	98.7
Mo./Hr.	7 20	7 21	7 19	7 19	10 17
Day Type	4	1	2	1	1

	..... Number of Hours .....				
Above 100	0	0	2,202	1,194	0
95 - 100	0	0	467	760	85
90 - 95	36	0	467	563	165
85 - 90	706	354	587	559	789
80 - 85	1,483	1,285	369	420	1,655
75 - 80	1,879	1,899	277	615	2,099
70 - 75	709	762	716	691	742
65 - 70	711	594	1,967	1,336	671
60 - 65	496	672	683	637	696
55 - 60	1,309	768	435	734	515
50 - 55	654	850	590	1,251	466
Below 50	777	1,576	0	0	877

Min. Temp.	40.6	31.4	55.0	54.9	32.7
Mo./Hr.	2 7	2 9	1 15	1 4	2 9
Day Type	5	4	3	2	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	3,946	20	176	1
Feb	3,572	20	164	1
March	4,307	20	59	1
April	3,738	20	12	1
May	5,502	32	0	0
June	6,312	32	0	0
July	6,213	32	0	0
Aug	6,673	32	0	0
Sept	5,068	32	0	0
Oct	4,111	20	8	1
Nov	3,743	20	41	1
Dec	3,757	20	137	1
Total	56,942	32	597	1

Building Energy Consumption = 38,044 (Btu/Sq Ft/Year)  
Source Energy Consumption = 99,245 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)



## ----- EQUIPMENT ENERGY CONSUMPTION -----

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	3923	3549	4297	3736	4110	4110	3736	4297	3736	4110	3736	3736	47,075
	PK	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4	20.4
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	821	1477	1670	1599	795	0	0	0	6,362
	PK	0.0	0.0	0.0	0.0	6.4	6.7	6.9	6.7	6.5	0.0	0.0	0.0	6.9
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	71	133	165	147	72	0	0	0	588
	PK	0.0	0.0	0.0	0.0	0.6	0.7	0.7	0.7	0.6	0.0	0.0	0.0	0.7
1	EQ5303	CONTROLS												
	ELEC	0	0	0	0	73	79	84	83	66	0	0	0	385
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
2	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	160	229	290	250	155	0	0	0	1,083
	PK	0.0	0.0	0.0	0.0	2.6	2.7	2.8	2.7	2.6	0.0	0.0	0.0	2.8
2	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	14	21	28	23	14	0	0	0	101
	PK	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.2
2	EQ5303	CONTROLS												

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
WEATHERSTRIP & CAULKING

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        32.5    (kW)  
Yearly Time of Peak 15 (hr)    7 (mo)

Hour 15    Month    7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	24.29
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	10.08

Sub Total			11.2	34.37
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	2.76
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Sub Total			0.9	2.76
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Sub Total			0.0	0.00
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Miscellaneous

Lights			20.4	62.87
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			20.4	62.87

Grand Total			32.5	100.00
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 330

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 10:34:47 12/27/93  
Dataset Name: CB330 .TM

AIRFLOW - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

----- SYSTEM SUMMARY -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil. Supply	Room Exhaust
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Airflow (Cfm)	Airflow (Cfm)
1	SZ	0	4,182	4,196	4,866	670	0	272
2	RAD	0	0	0	0	670	0	0
3	COMP	0	1,460	1,460	1,604	144	0	0
Totals		0	5,642	5,656	6,470	1,484	0	272

CAPACITY - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

----- SYSTEM SUMMARY -----  
(Design Capacity Quantities)

System Number	System Type	----- Cooling -----					----- Heating -----					
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
		Capacity	Capacity	Capacity	Totals	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Totals
		(Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)
1	SZ	7.8	0.0	0.0	7.8	-260,273	0	0	0	0	0	-260,273
2	RAD	0.0	0.0	0.0	0.0	-122,302	0	0	0	0	0	-122,302
3	COMP	1.6	0.0	0.0	1.6	-20,496	0	0	-5,402	0	0	-20,496
Totals		9.4	0.0	0.0	9.4	-403,071	0	0	-5,402	0	0	-403,071

The building peaked at hour 16 month 7 with a capacity of 9.1 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

----- ENGINEERING CHECKS -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	----- Cooling -----				----- Heating -----		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.32	536.6	405.2	29.61	1.33	-82.42	3,158
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-38.73	3,158
3	Main	COMP	0.00	4.04	885.9	219.1	54.78	4.04	-56.78	361

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	30.99	*	30,911	41.22	*	0	0	0.00
Glass Cond	5,602	0		5,602	5.99	*	5,256	7.01	*	-30,411	-30,411	11.68
Wall Cond	23,116	0		23,116	24.72	*	23,168	30.90	*	-45,240	-45,240	17.38
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	25,084			25,084	26.82	*	9,717	12.96	*	-46,651	-46,651	17.92
Sub Total==>	82,785	0		82,785	88.52	*	69,051	92.08	*	-122,302	-122,302	46.99
Internal Loads												
Lights	24,816	0		24,816	26.54	*	24,822	33.10	*	0	0	0.00
People	6,217			6,217	6.65	*	2,902	3.87	*	0	0	0.00
Misc	9,778	0	0	9,778	10.46	*	9,778	13.04	*	0	0	0.00
Sub Total==>	40,810	0	0	40,810	43.64	*	37,502	50.01	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.59	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-31,564			-31,564	-33.75	*	-31,564	-42.09	*	-137,970	-137,970	53.01
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	92,032	0	0	93,519	100.00	*	74,989	100.00	*	-260,272	-260,272	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	
Main Clg	7.8	93.5	75.4	4,182	75.0	62.4	66.5	58.2	54.9	60.6	3,158	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Totals	7.8	93.5									2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	--ENGINEERING CHECKS--			--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-260.3	4,196	68.0	125.0	Infil	670	670	Clg Cfm/Sqft	1.32	SADB	58.5	125.0	
Aux Htg	0.0	0	0.0	0.0	Supply	4,182	4,196	Clg Cfm/Ton	536.62	Plenum	75.0	68.0	
Preheat	-0.0	4,182	68.0	58.2	Mincfm	0	0	Clg Sqft/Ton	405.22	Return	75.0	68.0	
Reheat	0.0	0	0.0	0.0	Return	3,987	4,196	Clg Btuh/Sqft	29.61	Ret/OA	75.0	68.0	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	13	Runarnd	75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	272	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0	
Total	-260.3				Auxil	0	0	Htg Cfm/SqFt	1.33	Fn BldTD	0.1	0.0	
								Htg Btuh/SqFt	-82.42	Fn Frict	0.2	0.0	

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	24.87
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	36.99
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,651	-46,651	38.14
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-122,302	-122,302	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat PkUp		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-122,302	-122,302	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Roof	0	0 0
Totals	0.0	0.0				Wall	2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Main Htg	-122.3	0	0.0	0.0	Infil	0	670	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
Total	-122.3				Auxil	0	0	Htg Btuh/Sqft	-38.73	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Peak COMP - COMPUTER ROOM UNIT

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)		Space Sensible (Btuh)	Perct Of Tot (%)		Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0		836	4.23	*	1,050	6.36	*	-904	-904	5.99
Glass Solar	1,800	0		1,800	9.10	*	1,500	9.08	*	0	0	0.00
Glass Cond	406	0		406	2.05	*	437	2.64	*	-2,084	-2,084	13.81
Wall Cond	1,152	0		1,152	5.83	*	1,085	6.57	*	-2,043	-2,043	13.54
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	4,885			4,885	24.70	*	2,437	14.75	*	-10,063	-10,063	66.67
Sub Total==>	9,079	0		9,079	45.91	*	6,510	39.40	*	-15,094	-15,094	100.00
Internal Loads												
Lights	1,313	0		1,313	6.64	*	1,377	8.34	*	0	0	0.00
People	1,887			1,887	9.54	*	928	5.62	*	0	0	0.00
Misc	7,289	0	0	7,289	36.86	*	7,708	46.65	*	0	0	0.00
Sub Total==>	10,489	0	0	10,489	53.04	*	10,014	60.60	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	1.05	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	19,568	0	0	19,776	100.00	*	16,523	100.00	*	-15,094	-15,094	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	1.6	19.8	1,460	75.0 65.2 79.9	64.5 61.0 76.9	361		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	1.6	19.8				Roof	361	0 0
						Wall	556	30 5

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-20.5	1,460	64.6	77.5	Vent	0	0	Clg Cfm/Sqft	4.04	SADB	64.6	77.5
Aux Htg	0.0	0	0.0	0.0	Infil	144	144	Clg Cfm/Ton	885.92	Plenum	75.0	68.0
Preheat	-0.0	1,460	68.0	64.5	Supply	1,460	1,460	Clg Sqft/Ton	219.05	Return	75.0	68.0
Reheat	-5.4	1,460	64.6	68.0	Mincfm	0	1,460	Clg Btuh/Sqft	54.78	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Return	1,460	1,460	No. People	4	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-20.5				Rm Exh	0	0	Htg Cfm/Sqft	4.04	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-56.78	Fn Frict	0.1	0.1

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----



BUILDING U-VALUES - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone 2	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System 1	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone 2	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System 2	Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87

BUILDING AREAS - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

B U I L D I N G   A R E A S													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.				361	0	0	0	0	361	30	5	526
System	3 Total/Ave.				361	0	0	0	0	361	30	5	526
Building					6,677	0	0	0	0	361	905	16	4,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 2.14 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.5	0	0	-20,424	40	881	282.8	0	0	0.0	0	0
5 - 10	0.9	6	58	-40,847	35	782	565.6	0	0	0.0	0	0
10 - 15	1.4	0	4	-61,271	9	211	848.4	0	0	0.0	0	0
15 - 20	1.9	5	56	-81,695	5	106	1,131.2	0	0	0.0	0	0
20 - 25	2.4	6	60	-102,118	2	36	1,414.0	0	0	0.0	0	0
25 - 30	2.8	2	16	-122,542	9	208	1,696.8	0	0	0.0	0	0
30 - 35	3.3	0	4	-142,966	0	0	1,979.6	0	0	0.0	0	0
35 - 40	3.8	4	42	-163,389	0	0	2,262.4	0	0	0.0	0	0
40 - 45	4.2	4	45	-183,813	0	0	2,545.2	0	0	0.0	0	0
45 - 50	4.7	5	52	-204,237	0	0	2,828.0	0	0	0.0	0	0
50 - 55	5.2	7	75	-224,660	0	0	3,110.8	0	0	0.0	0	0
55 - 60	5.7	7	78	-245,084	0	0	3,393.6	0	0	0.0	0	0
60 - 65	6.1	7	69	-265,508	0	0	3,676.4	0	0	0.0	0	0
65 - 70	6.6	15	159	-285,931	0	0	3,959.2	0	0	0.0	0	0
70 - 75	7.1	7	77	-306,355	0	0	4,242.0	0	0	0.0	0	0
75 - 80	7.6	6	65	-326,779	0	0	4,524.8	0	0	0.0	0	0
80 - 85	8.0	5	48	-347,202	0	0	4,807.6	0	0	0.0	0	0
85 - 90	8.5	4	43	-367,626	0	0	5,090.4	0	0	0.0	0	0
90 - 95	9.0	0	0	-388,050	0	0	5,373.2	0	0	0.0	0	0
95 - 100	9.4	9	95	-408,473	0	0	5,656.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,714	0	0	6,536	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
 REPLACE FLUORESCENT LAMPS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----				
Range	1	2	1	2	3
(F)					

Max. Temp.	88.9	90.1	109.8	115.5	94.1
Mo./Hr.	7 21	7 21	7 18	7 19	10 17
Day Type	4	1	2	1	1

	..... Number of Hours .....				
Above 100	0	0	1,952	1,000	0
95 - 100	0	0	682	722	0
90 - 95	0	0	401	680	68
85 - 90	349	226	637	613	432
80 - 85	1,538	1,250	374	437	1,574
75 - 80	2,201	1,789	78	415	1,885
70 - 75	250	724	632	712	918
65 - 70	1,033	589	1,985	1,354	703
60 - 65	346	742	878	666	655
55 - 60	1,441	633	455	767	735
50 - 55	476	940	686	1,394	557
Below 50	1,126	1,867	0	0	1,233

Min. Temp.	39.0	30.4	55.0	55.0	30.5
Mo./Hr.	2 7	2 9	1 11	1 5	2 9
Day Type	5	4	3	1	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	3,469	18	215	1
Feb	3,141	18	207	1
March	3,782	18	84	1
April	3,281	18	20	1
May	4,774	29	0	0
June	5,643	30	0	0
July	5,841	30	0	0
Aug	6,005	30	0	0
Sept	4,438	29	0	0
Oct	3,608	18	16	1
Nov	3,286	18	55	1
Dec	3,303	18	169	1
Total	50,571	30	766	1

Building Energy Consumption = 37,315 (Btu/Sq Ft/Year)  
Source Energy Consumption = 92,843 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)

----- EQUIPMENT ENERGY CONSUMPTION -----

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	3442	3114	3769	3278	3606	3606	3278	3769	3278	3606	3278	3278	41,300
	PK	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9	17.9
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	659	1335	1749	1489	663	0	0	0	5,895
	PK	0.0	0.0	0.0	0.0	6.4	6.7	6.9	6.7	6.5	0.0	0.0	0.0	6.9
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	58	119	173	136	62	0	0	0	550
	PK	0.0	0.0	0.0	0.0	0.6	0.7	0.7	0.7	0.6	0.0	0.0	0.0	0.7
1	EQ5303	CONTROLS												
	ELEC	0	0	0	0	62	73	89	82	62	0	0	0	367
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
2	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	134	228	285	233	134	0	0	0	1,014
	PK	0.0	0.0	0.0	0.0	2.6	2.7	2.8	2.7	2.6	0.0	0.0	0.0	2.8
2	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	12	20	28	22	13	0	0	0	96
	PK	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.2
2	EQ5303	CONTROLS												

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
REPLACE FLUORESCENT LAMPS

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        30.0    (kW)  
Yearly Time of Peak 15 (hr)    7 (mo)

Hour 15    Month    7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	26.32
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	10.94

Sub Total			11.2	37.26
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	2.99
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Sub Total			0.9	2.99
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Sub Total			0.0	0.00
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Miscellaneous

Lights			17.9	59.76
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			17.9	59.76

Grand Total			30.0	100.00
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**                                     **
**          TRACE 600 ANALYSIS          **
**                                     **
**          by          **
**                                     **
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 330

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 10:52:17 12/27/93  
Dataset Name: CB330 .TM

AIRFLOW - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil.	Room
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Supply Airflow (Cfm)	Exhaust Airflow (Cfm)
1	SZ	0	4,182	4,196	4,866	670	0	272
2	RAD	0	0	0	0	670	0	0
3	COMP	0	1,460	1,460	1,604	144	0	0
Totals		0	5,642	5,656	6,470	1,484	0	272

CAPACITY - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

		Cooling				Heating						
System Number	System Type	Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
		Capacity (Tons)	Capacity (Tons)	Capacity (Tons)	Totals (Tons)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Totals (Btuh)
1	SZ	7.8	0.0	0.0	7.8	-260,273	0	0	0	0	0	-260,273
2	RAD	0.0	0.0	0.0	0.0	-122,302	0	0	0	0	0	-122,302
3	COMP	1.6	0.0	0.0	1.6	-20,289	0	0	-5,194	0	0	-20,289
Totals		9.5	0.0	0.0	9.5	-402,864	0	0	-5,194	0	0	-402,864

The building peaked at hour 16 month 7 with a capacity of 9.2 tons

ENGINEERING CHECKS - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.32	533.0	402.5	29.82	1.33	-82.42	3,158
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-38.73	3,158
3	Main	COMP	0.00	4.04	896.3	221.6	54.15	4.04	-56.20	361

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	30.78	*	30,911	40.87	*	0	0	0.00
Glass Cond	5,602	0		5,602	5.95	*	5,256	6.95	*	-30,411	-30,411	11.68
Wall Cond	23,116	0		23,116	24.55	*	23,168	30.63	*	-45,240	-45,240	17.38
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	25,084			25,084	26.64	*	9,717	12.85	*	-46,651	-46,651	17.92
Sub Total==>	82,785	0		82,785	87.92	*	69,051	91.30	*	-122,302	-122,302	46.99
Internal Loads						*			*			
Lights	21,033	0		21,033	22.34	*	21,039	27.82	*	0	0	0.00
People	6,217			6,217	6.60	*	2,902	3.84	*	0	0	0.00
Misc	9,778	0	0	9,778	10.38	*	9,778	12.93	*	0	0	0.00
Sub Total==>	37,028	0	0	37,028	39.32	*	33,718	44.58	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.58	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-27,140			-27,140	-28.82	*	-27,140	-35.89	*	-137,970	-137,970	53.01
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	92,673	0	0	94,160	100.00	*	75,630	100.00	*	-260,272	-260,272	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%) Part
Main Clg	7.8	94.2	4,182	75.0 62.4 66.5	58.1 54.8 60.6	3,158	0
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0	0
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0	0
Totals	7.8	94.2				2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-260.3	4,196	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	1.32	SADB	58.4	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	670	670	Clg Cfm/Ton	532.96	Plenum	75.0	68.0
Preheat	-0.0	4,182	68.0	58.1	Supply	4,182	4,196	Clg Sqft/Ton	402.46	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	29.82	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Return	3,987	4,196	No. People	13	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Total	-260.3				Rm Exh	272	0	Htg Cfm/Sqft	1.33	Fn BldTD	0.1	0.0
					Auxil	0	0	Htg Btuh/Sqft	-82.42	Fn Frict	0.2	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Percent		Space	Percent		Space Peak	Coil Peak	Percent
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	24.87
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	36.99
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,651	-46,651	38.14
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-122,302	-122,302	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-122,302	-122,302	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0 0 0
Totals	0.0	0.0									Wall	2,576 438 17

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	--ENGINEERING CHECKS--			--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-122.3	0	0.0	0.0	Infil	0	670	Clg Cfm/Sqft	0.00	SADB	0.0	68.1	
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	68.0	
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0	
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0	
Total	-122.3				Auxil	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0	
								Htg Btuh/SqFt	-38.73	Fn Frict	0.0	0.0	

System 3 Peak COMP - COMPUTER ROOM UNIT

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/15 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0	0	836	4.28	*	967	5.93	*	-904	-904	5.99
Glass Solar	1,800	0	0	1,800	9.21	*	1,680	10.30	*	0	0	0.00
Glass Cond	406	0	0	406	2.08	*	434	2.66	*	-2,084	-2,084	13.81
Wall Cond	1,152	0	0	1,152	5.90	*	1,143	7.00	*	-2,043	-2,043	13.54
Partition	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	4,858	0	0	4,858	24.85	*	2,516	15.42	*	-10,063	-10,063	66.67
Sub Total==>	9,052	0	0	9,052	46.31	*	6,739	41.31	*	-15,094	-15,094	100.00
Internal Loads												
Lights	1,111	0	0	1,111	5.69	*	1,138	6.98	*	0	0	0.00
People	1,887	0	0	1,887	9.65	*	898	5.50	*	0	0	0.00
Misc	7,289	0	0	7,289	37.29	*	7,540	46.21	*	0	0	0.00
Sub Total==>	10,287	0	0	10,287	52.63	*	9,576	58.69	*	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat	0	0	0	208	1.06	*	0	0.00	*	0	0	0.00
Ret. Fan Heat	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Duct Heat Pkup	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Terminal Bypass	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Grand Total==>	19,339	0	0	19,547	100.00	*	16,316	100.00	*	-15,094	-15,094	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	1.6	19.5	1,460	75.0 65.3 80.2	64.6 61.1 77.2	361		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	1.6	19.5				Roof	361	0 0
						Wall	556	30 5

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	4.04	SADB	64.7	77.5
Main Htg	-20.3	1,460	64.7	77.5	Infil	144	144	Clg Cfm/Ton	896.32	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Sqft/Ton	221.62	Return	75.0	68.0
Preheat	-0.0	1,460	68.0	64.6	Mincfm	0	1,460	Clg Btuh/Sqft	54.15	Ret/OA	75.0	68.0
Reheat	-5.2	1,460	64.7	68.0	Return	1,460	1,460	No. People	4	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	-0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	4.04	Fn BldTD	0.0	0.0
Total	-20.3				Auxil	0	0	Htg Btuh/Sqft	-56.20	Fn Frict	0.1	0.1

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87

BUILDING AREAS - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

BUILDING AREAS

Room Number	Description	Number of Duplicate Flr Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Sk1 /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
1	MEN	1 1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1 1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1 1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1 1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1 1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.			1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1 1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1 1	657	657	0	0	0	0	0	72	13	482
8	HALL	1 1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1 1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1 1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1 1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1 1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.			1,649	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.			3,158	0	0	0	0	0	438	17	2,139
1	MEN	1 1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1 1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1 1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1 1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1 1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.			1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1 1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1 1	657	657	0	0	0	0	0	72	13	482
8	HALL	1 1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1 1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1 1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1 1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1 1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.			1,649	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.			3,158	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1 1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.			361	0	0	0	0	361	30	5	526
System	3 Total/Ave.			361	0	0	0	0	361	30	5	526
Building				6,677	0	0	0	0	361	905	16	4,803



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ASHRAE 90 ANALYSIS - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTV<sub>r</sub>) = 2.14 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTV<sub>w</sub>) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.5	2	24	-20,403	40	924	282.8	0	0	0.0	0	0
5 - 10	0.9	3	34	-40,806	35	803	565.6	0	0	0.0	0	0
10 - 15	1.4	4	40	-61,209	7	172	848.4	0	0	0.0	0	0
15 - 20	1.9	9	96	-81,612	7	164	1,131.2	0	0	0.0	0	0
20 - 25	2.4	0	4	-102,015	1	24	1,414.0	0	0	0.0	0	0
25 - 30	2.8	0	0	-122,417	10	224	1,696.8	0	0	0.0	0	0
30 - 35	3.3	0	0	-142,820	0	0	1,979.6	0	0	0.0	0	0
35 - 40	3.8	8	86	-163,223	0	0	2,262.4	0	0	0.0	0	0
40 - 45	4.3	5	50	-183,626	0	0	2,545.2	0	0	0.0	0	0
45 - 50	4.7	9	97	-204,029	0	0	2,828.0	0	0	0.0	0	0
50 - 55	5.2	4	40	-224,432	0	0	3,110.8	0	0	0.0	0	0
55 - 60	5.7	14	142	-244,835	0	0	3,393.6	0	0	0.0	0	0
60 - 65	6.2	11	114	-265,238	0	0	3,676.4	0	0	0.0	0	0
65 - 70	6.6	2	26	-285,641	0	0	3,959.2	0	0	0.0	0	0
70 - 75	7.1	6	65	-306,044	0	0	4,242.0	0	0	0.0	0	0
75 - 80	7.6	8	85	-326,447	0	0	4,524.8	0	0	0.0	0	0
80 - 85	8.1	5	48	-346,850	0	0	4,807.6	0	0	0.0	0	0
85 - 90	8.5	0	0	-367,252	0	0	5,090.4	0	0	0.0	0	0
90 - 95	9.0	4	40	-387,655	0	0	5,373.2	0	0	0.0	0	0
95 - 100	9.5	5	55	-408,058	0	0	5,656.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,714	0	0	6,449	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

----- BUILDING TEMPERATURE PROFILES -----						
Temperature	----- Zone Number -----					
Range (F)	1	2	1	2	3	
Max. Temp.	88.6	89.4	108.5	113.9	93.6	
Mo./Hr.	7 21	7 21	7 19	7 19	10 17	
Day Type	4	1	2	1	1	
	..... Number of Hours .....					
Above 100	0	0	1,674	792	0	
95 - 100	0	0	851	792	0	
90 - 95	0	0	412	752	51	
85 - 90	319	171	687	613	405	
80 - 85	1,500	1,244	184	489	1,582	
75 - 80	2,265	1,741	292	343	2,005	
70 - 75	200	766	592	696	775	
65 - 70	1,044	553	1,974	1,351	694	
60 - 65	265	789	921	730	703	
55 - 60	1,211	578	483	789	722	
50 - 55	688	906	690	1,413	544	
Below 50	1,268	2,012	0	0	1,279	
Min. Temp.	38.8	30.4	55.0	55.0	30.5	
Mo./Hr.	2 7	2 9	1 11	1 5	2 9	
Day Type	5	4	3	1	4	

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4  
 REPLACE FLUORESCENT BALLASTS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	2,945	15	224	1
Feb	2,666	15	216	1
March	3,208	15	91	1
April	2,781	15	22	1
May	4,141	26	0	0
June	4,976	27	0	0
July	5,297	27	0	0
Aug	5,291	27	0	0
Sept	3,853	27	0	0
Oct	3,058	15	18	1
Nov	2,787	15	60	1
Dec	2,804	15	176	1
Total	43,805	27	806	1

Building Energy Consumption = 34,460 (Btu/Sq Ft/Year)  
 Source Energy Consumption = 83,271 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION -----

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	2916	2639	3194	2778	3055	3055	2778	3194	2778	3055	2778	2778	34,998
	PK	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2	15.2
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	586	1250	1717	1373	595	0	0	0	5,522
	PK	0.0	0.0	0.0	0.0	6.4	6.7	6.9	6.7	6.5	0.0	0.0	0.0	6.9
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	52	112	170	125	56	0	0	0	515
	PK	0.0	0.0	0.0	0.0	0.6	0.7	0.7	0.7	0.6	0.0	0.0	0.0	0.7
1	EQ5303	CONTROLS												
	ELEC	0	0	0	0	62	73	84	76	56	0	0	0	351
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
2	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	130	205	281	228	130	0	0	0	974
	PK	0.0	0.0	0.0	0.0	2.6	2.7	2.8	2.7	2.6	0.0	0.0	0.0	2.8
2	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	12	19	28	21	12	0	0	0	93
	PK	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.2
2	EQ5303	CONTROLS												

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4  
REPLACE FLUORESCENT BALLASTS

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility   ELECTRIC DEMAND

Peak Value        27.2    (kW)  
Yearly Time of Peak 15 (hr)   7 (mo)

Hour 15   Month   7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	28.96
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	12.03

Sub Total			11.2	40.99
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	3.29
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Sub Total			0.9	3.29
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Sub Total			0.0	0.00
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Miscellaneous

Lights			15.2	55.72
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			15.2	55.72

Grand Total			27.2	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 330

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:53:36 12/27/93  
Dataset Name: CB3308 .TM



AIRFLOW - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	SZ	0	4,182	4,196	4,866	670	0	272
2	RAD	0	0	0	0	670	0	0
3	COMP	0	1,460	1,460	1,604	144	0	0
Totals		0	5,642	5,656	6,470	1,484	0	272

CAPACITY - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	----- Cooling -----					----- Heating -----					
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	SZ	7.9	0.0	0.0	7.9	-260,273	0	0	0	0	0	-260,273
2	RAD	0.0	0.0	0.0	0.0	-122,302	0	0	0	0	0	-122,302
3	COMP	1.6	0.0	0.0	1.6	-20,082	0	0	-4,987	0	0	-20,082
Totals		9.5	0.0	0.0	9.5	-402,657	0	0	-4,987	0	0	-402,657

The building peaked at hour 16 month 7 with a capacity of 9.2 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	----- Cooling -----				--- Heating ---		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.32	529.3	399.7	30.02	1.33	-82.42	3,158
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-38.73	3,158
3	Main	COMP	0.00	4.04	907.0	224.3	53.51	4.04	-55.63	361

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	30.57	*	30,911	40.53	*	0	0	0.00
Glass Cond	5,580	0		5,580	5.89	*	5,256	6.89	*	-30,411	-30,411	11.68
Wall Cond	23,076	0		23,076	24.34	*	23,168	30.38	*	-45,240	-45,240	17.38
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	25,257			25,257	26.64	*	9,717	12.74	*	-46,651	-46,651	17.92
Sub Total==>	82,896	0		82,896	87.44	*	69,051	90.54	*	-122,302	-122,302	46.99
Internal Loads						*			*			
Lights	17,488	0		17,488	18.45	*	17,559	23.02	*	0	0	0.00
People	6,204			6,204	6.54	*	2,902	3.81	*	0	0	0.00
Misc	9,759	0	0	9,759	10.29	*	9,778	12.82	*	0	0	0.00
Sub Total==>	33,451	0	0	33,451	35.28	*	30,239	39.65	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.57	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-23,027			-23,027	-24.29	*	-23,027	-30.19	*	-137,970	-137,970	53.01
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	93,320	0	0	94,807	100.00	*	76,263	100.00	*	-260,272	-260,272	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	3,158	
Main Clg	7.9	94.8	4,182	75.0	62.4	66.5	57.9	54.8	60.6	Part	0	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0 0
Totals	7.9	94.8								Wall	2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	ENGINEERING CHECKS--			TEMPERATURES (F)---		
								Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-260.3	4,196	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	1.32	SADB	58.2	125.0	
Aux Htg	0.0	0	0.0	0.0	Infil	670	670	Clg Cfm/Ton	529.33	Plenum	75.0	68.0	
Preheat	-0.0	4,182	68.0	57.9	Supply	4,182	4,196	Clg Sqft/Ton	399.72	Return	75.0	68.0	
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	30.02	Ret/OA	75.0	68.0	
Humidif	0.0	0	0.0	0.0	Return	3,987	4,196	No. People	13	Runarnd	75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0	
Total	-260.3				Rm Exh	272	0	Htg Cfm/Sqft	1.33	Fn BldTD	0.1	0.0	
					Auxil	0	0	Htg Btuh/Sqft	-82.42	Fn Frict	0.2	0.0	

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	24.87
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	36.99
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,651	-46,651	38.14
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-122,302	-122,302	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-122,302	-122,302	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Floor	3,158	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	0.0	0.0				Roof	0	0 0
						Wall	2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-122.3	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	670	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-122.3				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-38.73	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Peak COMP - COMPUTER ROOM UNIT

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/15 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0		836	4.33	*	967	6.00	*	-904	-904	5.99
Glass Solar	1,800	0		1,800	9.32	*	1,680	10.43	*	0	0	0.00
Glass Cond	406	0		406	2.10	*	434	2.69	*	-2,084	-2,084	13.81
Wall Cond	1,152	0		1,152	5.97	*	1,143	7.09	*	-2,043	-2,043	13.54
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	4,830			4,830	25.00	*	2,516	15.62	*	-10,063	-10,063	66.67
Sub Total==>	9,024	0		9,024	46.71	*	6,739	41.84	*	-15,094	-15,094	100.00
Internal Loads						*			*			
Lights	909	0		909	4.71	*	931	5.78	*	0	0	0.00
People	1,887			1,887	9.77	*	898	5.57	*	0	0	0.00
Misc	7,289	0	0	7,289	37.73	*	7,540	46.81	*	0	0	0.00
Sub Total==>	10,085	0	0	10,085	52.21	*	9,369	58.16	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	1.07	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	19,109	0	0	19,317	100.00	*	16,109	100.00	*	-15,094	-15,094	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	1.6	19.3	1,460	75.0	65.3	80.4	64.7	61.2	77.5	Part	0	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	361	0 0
Totals	1.6	19.3								Wall	556	30 5

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA		Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft		SADB		
Main Htg	-20.1	1,460	64.9	77.5	Infil	144	144	Clg Cfm/Ton	906.98	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Sqft/Ton	224.26	Return	75.0	68.0
Preheat	-0.0	1,460	68.0	64.7	Mincfm	0	1,460	Clg Btuh/Sqft	53.51	Ret/OA	75.0	68.0
Reheat	-5.0	1,460	64.9	68.0	Return	1,460	1,460	No. People	4	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	4.04	Fn BldTD	0.0	0.0
Total	-20.1				Auxil	0	0	Htg Btuh/Sqft	-55.63	Fn Frict	0.1	0.1

BUILDING U-VALUES - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87

BUILDING AREAS - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.				361	0	0	0	0	361	30	5	526
System	3 Total/Ave.				361	0	0	0	0	361	30	5	526
Building					6,677	0	0	0	0	361	905	16	4,803

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By: Trane Customer Direct Service Network

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ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 2.14 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.5	2	16	-20,382	40	980	282.8	0	0	0.0	0	0
5 - 10	1.0	5	52	-40,764	35	837	565.6	0	0	0.0	0	0
10 - 15	1.4	6	60	-61,147	7	172	848.4	0	0	0.0	0	0
15 - 20	1.9	6	58	-81,529	7	160	1,131.2	0	0	0.0	0	0
20 - 25	2.4	0	4	-101,911	2	48	1,414.0	0	0	0.0	0	0
25 - 30	2.9	2	22	-122,293	2	56	1,696.8	0	0	0.0	0	0
30 - 35	3.3	2	16	-142,675	7	168	1,979.6	0	0	0.0	0	0
35 - 40	3.8	5	48	-163,058	0	0	2,262.4	0	0	0.0	0	0
40 - 45	4.3	14	143	-183,440	0	0	2,545.2	0	0	0.0	0	0
45 - 50	4.8	4	42	-203,822	0	0	2,828.0	0	0	0.0	0	0
50 - 55	5.2	15	153	-224,204	0	0	3,110.8	0	0	0.0	0	0
55 - 60	5.7	10	101	-244,587	0	0	3,393.6	0	0	0.0	0	0
60 - 65	6.2	3	30	-264,969	0	0	3,676.4	0	0	0.0	0	0
65 - 70	6.7	4	43	-285,351	0	0	3,959.2	0	0	0.0	0	0
70 - 75	7.1	4	44	-305,733	0	0	4,242.0	0	0	0.0	0	0
75 - 80	7.6	9	91	-326,115	0	0	4,524.8	0	0	0.0	0	0
80 - 85	8.1	2	20	-346,498	0	0	4,807.6	0	0	0.0	0	0
85 - 90	8.6	0	0	-366,880	0	0	5,090.4	0	0	0.0	0	0
90 - 95	9.0	9	95	-387,262	0	0	5,373.2	0	0	0.0	0	0
95 - 100	9.5	0	0	-407,644	0	0	5,656.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,722	0	0	6,339	0.0	0	7,690	0.0	0	8,760



BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	Zone Number				
	1	2	1	2	3

Max. Temp.	88.4	89.3	107.4	112.2	93.1
Mo./Hr.	7 21	7 19	7 19	7 19	10 17
Day Type	4	4	2	1	1

	Number of Hours				
Above 100	0	0	1,320	652	0
95 - 100	0	0	1,138	702	0
90 - 95	0	0	315	872	0
85 - 90	299	151	718	642	430
80 - 85	1,429	1,234	266	504	1,594
75 - 80	2,216	1,697	339	340	1,935
70 - 75	176	753	566	597	816
65 - 70	1,076	575	1,996	1,496	678
60 - 65	384	734	898	737	750
55 - 60	914	633	505	730	714
50 - 55	968	760	699	1,488	543
Below 50	1,298	2,223	0	0	1,300

Min. Temp.	38.6	30.3	55.0	54.9	30.5
Mo./Hr.	2 7	2 9	1 11	12 6	2 9
Day Type	5	4	3	1	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	2,461	13	232	1
Feb	2,228	13	224	1
March	2,680	13	98	1
April	2,321	13	24	1
May	3,558	24	0	0
June	4,380	24	0	0
July	4,789	25	0	0
Aug	4,641	24	0	0
Sept	3,316	24	0	0
Oct	2,551	13	20	1
Nov	2,325	13	64	1
Dec	2,345	13	184	1
Total	37,595	25	845	1

Building Energy Consumption = 31,874 (Btu/Sq Ft/Year)  
Source Energy Consumption = 74,532 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION -----

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	2432	2201	2664	2316	2548	2548	2316	2664	2316	2548	2316	2316	29,188
	PK	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	522	1174	1679	1268	535	0	0	0	5,178
	PK	0.0	0.0	0.0	0.0	6.4	6.7	6.9	6.7	6.5	0.0	0.0	0.0	6.9
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	47	105	166	115	50	0	0	0	484
	PK	0.0	0.0	0.0	0.0	0.6	0.7	0.7	0.7	0.6	0.0	0.0	0.0	0.7
1	EQ5303	CONTROLS												
	ELEC	0	0	0	0	61	73	84	76	55	0	0	0	349
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
2	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	126	200	276	223	127	0	0	0	952
	PK	0.0	0.0	0.0	0.0	2.6	2.7	2.8	2.7	2.6	0.0	0.0	0.0	2.8
2	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	12	19	27	21	12	0	0	0	91
	PK	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.2
2	EQ5303	CONTROLS												

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
REPLACE FLUORESCENT FIXTURES

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        24.7    (kW)  
Yearly Time of Peak 15 (hr)    7 (mo)

Hour 15    Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
Cooling Equipment				
1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	31.91
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	13.25
Sub Total			11.2	45.16
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	3.62
Sub Total			0.9	3.62
Sub Total			0.0	0.00
Miscellaneous				
	Lights		12.7	51.22
	Base Utilities		0.0	0.00
	Misc Equipment		0.0	0.00
Sub Total			12.7	51.22
Grand Total			24.7	100.00

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**          T R A C E    6 0 0    A N A L Y S I S          **
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ENERGY SAVINGS OPPORTUNITY STUDY

CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 330

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:10:39 12/27/93  
Dataset Name: CB3308 .TM

AIRFLOW - ALTERNATIVE 2  
COMBINED ECOS

----- SYSTEM SUMMARY -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil.	Room
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Supply Airflow (Cfm)	Exhaust Airflow (Cfm)
1	SZ	0	4,182	4,182	4,071	489	0	272
2	RAD	0	0	0	0	489	0	0
3	COMP	0	1,460	1,460	1,566	106	0	0
Totals		0	5,642	5,642	6,237	1,085	0	272

CAPACITY - ALTERNATIVE 2  
COMBINED ECOS

----- SYSTEM SUMMARY -----  
(Design Capacity Quantities)

System Number	System Type	----- Cooling -----					----- Heating -----						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)	
1	SZ	7.2	0.0	0.0	7.2	-245,626	0	0	0	0	0	-245,626	
2	RAD	0.0	0.0	0.0	0.0	-109,743	0	0	0	0	0	-109,743	
3	COMP	1.5	0.0	0.0	1.5	-16,707	0	0	-4,322	0	0	-16,707	
Totals		8.7	0.0	0.0	8.7	-372,076	0	0	-4,322	0	0	-372,076	

The building peaked at hour 16 month 7 with a capacity of 8.4 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
COMBINED ECOS

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	----- Cooling -----				--- Heating ---		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.32	578.0	436.5	27.49	1.32	-77.78	3,158
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-34.75	3,158
3	Main	COMP	0.00	4.04	971.5	240.2	49.96	4.04	-46.28	361

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	28,983	0		28,983	33.38	*	30,911	42.68	*	0	0	0.00
Glass Cond	5,602	0		5,602	6.45	*	5,256	7.26	*	-30,411	-30,411	12.38
Wall Cond	23,116	0		23,116	26.63	*	23,168	31.99	*	-45,240	-45,240	18.42
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	18,330			18,330	21.11	*	7,101	9.80	*	-34,091	-34,091	13.88
Sub Total==>	76,032	0		76,032	87.57	*	66,435	91.73	*	-109,742	-109,742	44.68
Internal Loads						*			*			
Lights	17,555	0		17,555	20.22	*	17,559	24.24	*	0	0	0.00
People	6,217			6,217	7.16	*	2,902	4.01	*	0	0	0.00
Misc	9,778	0	0	9,778	11.26	*	9,778	13.50	*	0	0	0.00
Sub Total==>	33,549	0	0	33,549	38.64	*	30,239	41.75	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				1,487	1.71	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-24,247			-24,247	-27.93	*	-24,247	-33.48	*	-135,884	-135,884	55.32
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	85,334	0	0	86,821	100.00	*	72,427	100.00	*	-245,626	-245,626	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%) Part
Main Clg	7.2	86.8	72.7	4,182 75.0 62.4 66.5	58.8 55.5 62.0	3,158	0
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0	0
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0	0
Totals	7.2	86.8				2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-245.6	4,182	68.0	122.0	Vent	0	0	Clg Cfm/Sqft	1.32	SADB	59.1	122.0
Aux Htg	0.0	0	0.0	0.0	Infil	489	489	Clg Cfm/Ton	578.02	Plenum	75.0	68.0
Preheat	-0.0	4,182	68.0	58.8	Supply	4,182	4,182	Clg Sqft/Ton	436.48	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	27.49	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Return	3,966	4,182	No. People	13	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Total	-245.6				Rm Exh	272	0	Htg Cfm/Sqft	1.32	Fn BldTD	0.1	0.0
					Auxil	0	0	Htg Btuh/Sqft	-77.78	Fn Frict	0.2	0.0



System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-30,411	-30,411	27.71
Wall Cond	0	0		0	0.00	*	0	0.00	*	-45,240	-45,240	41.22
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-34,091	-34,091	31.06
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-109,742	-109,742	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-109,742	-109,742	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%) Part
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	3,158	0
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0	0
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0	0
Totals	0.0	0.0				2,576	438 17

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-109.7	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	489	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-109.7				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-34.75	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Peak COMP - COMPUTER ROOM UNIT

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	836	0		836	4.63	*	1,050	6.80	*	-904	-904	7.30
Glass Solar	1,800	0		1,800	9.98	*	1,500	9.71	*	0	0	0.00
Glass Cond	406	0		406	2.25	*	437	2.83	*	-2,084	-2,084	16.83
Wall Cond	1,152	0		1,152	6.39	*	1,085	7.03	*	-2,043	-2,043	16.50
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	3,547			3,547	19.67	*	1,781	11.53	*	-7,354	-7,354	59.38
Sub Total==>	7,741	0		7,741	42.92	*	5,854	37.90	*	-12,385	-12,385	100.00
Internal Loads						*			*			
Lights	909	0		909	5.04	*	954	6.18	*	0	0	0.00
People	1,887			1,887	10.46	*	928	6.01	*	0	0	0.00
Misc	7,289	0	0	7,289	40.42	*	7,708	49.91	*	0	0	0.00
Sub Total==>	10,085	0	0	10,085	55.92	*	9,590	62.10	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				208	1.15	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	17,826	0	0	18,034	100.00	*	15,443	100.00	*	-12,385	-12,385	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	1.5	18.0	1,460	75.0	65.3	80.3	65.1	61.5	78.0	361		
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Totals	1.5	18.0								Roof	361	0 0
										Wall	556	30 5

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA		Type	Clg	Htg
					Vent	0	0		0.0	SADB	65.3	75.8
Main Htg	-16.7	1,460	65.3	75.8	Infil	106	106	Clg Cfm/Sqft	4.04	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	1,460	1,460	Clg Cfm/Ton	971.51	Return	75.0	68.0
Preheat	-0.0	1,460	68.0	65.1	Mincfm	0	1,460	Clg Sqft/Ton	240.22	Ret/OA	75.0	68.0
Reheat	-4.3	1,460	65.3	68.0	Return	1,460	1,460	Clg Btuh/Sqft	49.96	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	4	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn BldTD	0.0	0.0
Total	-16.7				Auxil	0	0	Htg Cfm/Sqft	4.04	Fn Frict	0.1	0.1
								Htg Btuh/Sqft	-46.28			

BUILDING U-VALUES - ALTERNATIVE 2  
COMBINED ECOS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
1	MEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	226.9	49.13
2	WOMEN	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	164.8	35.62
3	ENGR RESOURCES	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.357	0.000	74.0	15.86
4	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
5	ENTRANCE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.8	4.63
Zone	1 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.348	0.000	80.5	17.24
6	PRINT ROOM	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	20.8	4.07
7	ENGINEERING	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.53
8	HALL	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
9	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.5	3.63
10	RECEPTION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
11	OFFICE	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	18.6	3.65
12	SECRETARY	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	23.5	4.57
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.316	0.000	17.9	3.51
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.000	1.040	1.086	0.331	0.000	47.8	10.07
13	COMPUTER ROOM	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.061	0.000	28.9	6.33
Building		0.000	0.000	0.000	0.000	0.039	1.040	1.086	0.301	0.000	46.7	9.87

BUILDING AREAS - ALTERNATIVE 2  
COMBINED ECOS

BUILDING AREAS

Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	1 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
1	MEN	1	1	105	105	0	0	0	0	0	20	11	167
2	WOMEN	1	1	87	87	0	0	0	0	0	10	9	98
3	ENGR RESOURCES	1	1	1,062	1,062	0	0	0	0	0	160	25	479
4	OFFICE	1	1	135	135	0	0	0	0	0	0	0	0
5	ENTRANCE	1	1	120	120	0	0	0	0	0	24	11	201
Zone	1 Total/Ave.				1,509	0	0	0	0	0	214	18	945
6	PRINT ROOM	1	1	169	169	0	0	0	0	0	32	14	202
7	ENGINEERING	1	1	657	657	0	0	0	0	0	72	13	482
8	HALL	1	1	194	194	0	0	0	0	0	0	0	0
9	OFFICE	1	1	140	140	0	0	0	0	0	24	17	116
10	RECEPTION	1	1	105	105	0	0	0	0	0	0	0	0
11	OFFICE	1	1	293	293	0	0	0	0	0	64	21	247
12	SECRETARY	1	1	91	91	0	0	0	0	0	32	18	148
Zone	2 Total/Ave.				1,649	0	0	0	0	0	224	16	1,194
System	2 Total/Ave.				3,158	0	0	0	0	0	438	17	2,139
13	COMPUTER ROOM	1	1	361	361	0	0	0	0	361	30	5	526
Zone	3 Total/Ave.				361	0	0	0	0	361	30	5	526
System	3 Total/Ave.				361	0	0	0	0	361	30	5	526
Building					6,677	0	0	0	0	361	905	16	4,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
COMBINED ECOS

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.039 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.418 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.396 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 2.14 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 29.81 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.4	0	0	-18,820	41	894	282.1	0	0	0.0	0	0
5 - 10	0.9	2	16	-37,640	33	724	564.2	0	0	0.0	0	0
10 - 15	1.3	4	42	-56,460	8	186	846.3	0	0	0.0	0	0
15 - 20	1.7	7	76	-75,280	6	137	1,128.4	0	0	0.0	0	0
20 - 25	2.2	5	58	-94,099	1	24	1,410.5	0	0	0.0	0	0
25 - 30	2.6	2	22	-112,919	10	228	1,692.6	0	0	0.0	0	0
30 - 35	3.1	0	0	-131,739	0	0	1,974.7	0	0	0.0	0	0
35 - 40	3.5	4	42	-150,559	0	0	2,256.8	0	0	0.0	0	0
40 - 45	3.9	2	26	-169,379	0	0	2,538.9	0	0	0.0	0	0
45 - 50	4.4	6	59	-188,199	0	0	2,821.0	0	0	0.0	0	0
50 - 55	4.8	6	61	-207,019	0	0	3,103.1	0	0	0.0	0	0
55 - 60	5.2	13	141	-225,839	0	0	3,385.2	0	0	0.0	0	0
60 - 65	5.7	8	90	-244,659	0	0	3,667.3	0	0	0.0	0	0
65 - 70	6.1	4	45	-263,478	0	0	3,949.4	0	0	0.0	0	0
70 - 75	6.6	13	133	-282,298	0	0	4,231.5	0	0	0.0	0	0
75 - 80	7.0	12	131	-301,118	0	0	4,513.6	0	0	0.0	0	0
80 - 85	7.4	2	20	-319,938	0	0	4,795.7	0	0	0.0	0	0
85 - 90	7.9	0	0	-338,758	0	0	5,077.8	0	0	0.0	0	0
90 - 95	8.3	4	40	-357,578	0	0	5,359.9	0	0	0.0	0	0
95 - 100	8.7	6	60	-376,398	0	0	5,642.0	100	1,070	0.0	0	0
Hours Off	0.0	0	7,698	0	0	6,567	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
 COMBINED ECOS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature Range (F)	----- Zone Number -----				
	1	2	1	2	3
Max. Temp.	89.4	89.8	107.4	112.2	96.7
Mo./Hr.	7 21	7 19	7 19	7 19	10 17
Day Type	4	4	2	1	1
	..... Number of Hours .....				
Above 100	0	0	1,320	652	0
95 - 100	0	0	1,138	702	0
90 - 95	0	0	315	872	168
85 - 90	364	177	787	678	567
80 - 85	1,564	1,340	469	472	1,701
75 - 80	2,160	1,730	79	420	1,864
70 - 75	237	777	632	698	995
65 - 70	1,090	538	2,117	1,420	749
60 - 65	253	744	836	676	712
55 - 60	1,519	648	456	851	535
50 - 55	428	863	611	1,319	520
Below 50	1,145	1,943	0	0	949
Min. Temp.	39.8	31.2	54.9	54.9	32.6
Mo./Hr.	2 8	2 9	2 2	1 2	2 9
Day Type	5	4	5	3	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	2,460	13	198	1
Feb	2,226	13	186	1
March	2,676	13	75	1
April	2,319	13	17	1
May	3,681	24	0	0
June	4,476	24	0	0
July	4,683	25	0	0
Aug	4,774	24	0	0
Sept	3,408	24	0	0
Oct	2,550	13	14	1
Nov	2,325	13	52	1
Dec	2,342	13	157	1
Total	37,920	25	699	1

Building Energy Consumption = 29,858 (Btu/Sq Ft/Year)  
Source Energy Consumption = 72,121 (Btu/Sq Ft/Year)

Floor Area = 6,677 (Sq Ft)



## EQUIPMENT ENERGY CONSUMPTION

Ref	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	2432	2201	2664	2316	2548	2548	2316	2664	2316	2548	2316	2316	29,188
	PK	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	609	1219	1591	1355	597	0	0	0	5,371
	PK	0.0	0.0	0.0	0.0	6.4	6.7	6.9	6.7	6.5	0.0	0.0	0.0	6.9
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	53	108	157	123	55	0	0	0	497
	PK	0.0	0.0	0.0	0.0	0.6	0.7	0.7	0.7	0.6	0.0	0.0	0.0	0.7
1	EQ5303	CONTROLS												
	ELEC	0	0	0	0	65	73	78	76	59	0	0	0	350
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
2	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	145	243	274	257	141	0	0	0	1,061
	PK	0.0	0.0	0.0	0.0	2.6	2.7	2.8	2.7	2.6	0.0	0.0	0.0	2.8
2	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	13	22	27	24	13	0	0	0	99
	PK	0.0	0.0	0.0	0.0	0.1	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.2
2	EQ5303	CONTROLS												

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 24.7 (kW)  
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	7.9	31.93
2	EQ1161	AIR-CLD COND COMP <15 TONS	3.3	13.21

Sub Total			11.2	45.14
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.9	3.62
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Sub Total			0.9	3.62
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Sub Total			0.0	0.00
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Miscellaneous

Lights			12.7	51.24
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			12.7	51.24

Grand Total			24.7	100.00
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***Building 400***  
***Trace Input File***

933702

CONTENTS OF : E:\CB400.TM

LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 400

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/BASE BUILDING

13 20/1/1/GRND FL OFFICES/1156/1//0//11

14 20/2/1/GUARD OFFICER/231/1//0//10.8

15 20/3/1/CELL BLOCK/459/1//0//10.8

16 20/4/1/DAY ROOM/334/1//0//10.8

17 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7

18 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7

19 20/7/1/OFFICER/127/1//0//11.2

20 20/8/1/GUARDS DORM/506/1//0//11.2

21 20/9/1/FIREMANS DORM/780/1//0//11.2

22 20/10/1/2ND FL OFFICE/220/1//0//11.2

23 20/11/2/PROVOST MARSHALL/182/1//0//11

24 20/12/2/NCO/110/1//0//11.2

25 20/13/2/GUARDS DORM/251/1//0//11.2

26 20/14/2/TOILETS/300/1//0//11.2

27 20/15/3/TRUCK ROOM/1280/1//0//14.7

28 21/M////CBADCTX///CBADHTX

29 22/1/1/YES////130

30 22/7/1/YES////130

31 22/8/1/YES////130

32 22/9/1/YES////130

33 22/10/1/YES////130

34 22/11/1/YES////130

35 22/12/1/YES////130

36 22/13/1/YES////130

37 22/14/1/YES////130

38 24/1/1/31/10//172/20

39 24/1/2/29/10//172/110

40 24/1/3/48/10//172/200

41 24/2/1/8/10//172/110

42 24/2/2/22/10//172/200

43 24/3/1/27/10//172/20

44 24/3/2/8/10//172/110

45 24/4/1/6/10//172/20

46 24/5/1/7/14.3//172/110

47 24/5/2/44/14.3//172/200

48 24/6/1/22/14.3//172/20

49 24/6/2/7/14.3//172/110

50 24/7/1/11/10.2//172/110

51 24/7/2/11/10.2//172/200

52 24/8/1/22/10.2//172/200

53 24/9/1/23/10.2//172/290

54 24/9/2/33/10.2//172/20

55 24/10/1/22/10.2//172/20

56 24/10/2/10/10.2//172/110

57 24/11/1/17/10//172/20

58 24/12/1/10/10.2//172/200

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LINE #	
59	24/13/1/10/10.2//172/200
60	24/13/2/24/10.2//172/290
61	24/14/1/26/10.2//172/110
62	24/15/1/43/14.3//172/290
63	24/15/2/33/14.3//172/20
64	25/1/1/4.5/2.5/5/.81/.64
65	25/1/2/4.5/2.5/2/.81/.64
66	25/1/3/4.5/2.5/4/.81/.64
67	25/2/1/4.5/2.5/1/.81/.64
68	25/2/2/4.5/2.5/1/.81/.64
69	25/3/1/4.5/2.5/2/.81/.64
70	25/3/2/4.5/2.5/1/.81/.64
71	25/4/1/4.5/2.5/1/.81/.64
72	25/5/1/6.5/2.5/1/.81/.64
73	25/5/2/55/1/1/.81/.64
74	25/6/1/6.5/2.5/2/.81/.64
75	25/6/2/6.5/2.5/1/.81/.64
76	25/7/1/5.5/2.5/1/.81/.64
77	25/7/2/5.5/2.5/1/.81/.64
78	25/8/1/5.5/2.5/2/.81/.64
79	25/9/1/5.5/2.5/2/.81/.64
80	25/9/2/5.5/2.5/3/.81/.64
81	25/10/1/5.5/2.5/2/.81/.64
82	25/10/2/5.5/2.5/1/.81/.64
83	25/11/1/4.5/2.5/2/.81/.64
84	25/12/1/5.5/2.5/1/.81/.64
85	25/13/1/5.5/2.5/1/.81/.64
86	25/13/2/5.5/2.5/2/.81/.64
87	25/14/1/5.5/2.5/2/.81/.64
88	25/15/1/74/1/1/1.04/1
89	25/15/2/4.5/2.5/3/.81/.64
90	26/M/CBAPD&L/CBAPD&L/OFF//OFF/CBADCLG/OFF/OFF/OFF/OFF
91	27/M/340/SF-PERS/255/255/1.8/WATT-SF
92	29/1////////.38/CFM-SF/.38/CFM-SF
93	29/2////////.38/CFM-SF/.38/CFM-SF
94	29/3////////.38/CFM-SF/.38/CFM-SF
95	29/4////////.38/CFM-SF/.38/CFM-SF
96	29/5////////.38/CFM-SF/.38/CFM-SF
97	29/6////////.38/CFM-SF/.38/CFM-SF
98	29/7////////.38/CFM-SF/.38/CFM-SF
99	29/8////////.38/CFM-SF/.38/CFM-SF
100	29/9////////.38/CFM-SF/.38/CFM-SF
101	29/10////////.38/CFM-SF/.38/CFM-SF
102	29/11////////.38/CFM-SF
103	29/12////////.38/CFM-SF
104	29/13////////.38/CFM-SF
105	29/14////////.38/CFM-SF
106	29/15////////1.17/CFM-SF
107	31/4/1/32/10.3//147/SINE-FIT/80/50
108	SYSTEM - 1
109	39/1/BASE BUILDING
110	40/1/PTAC
111	41/1/1/1
112	42/1/.2
113	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
114	40/2/RAD
115	41/2/1/2
116	42/2

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LINE #	
117	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
118	40/3/UH
119	41/3/3/3
120	42/3//.1
121	45/3/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
122	EQUIPMENT - 1
123	59/1/CARLISLE///BASE BUILDING
124	60/1/1/PKPLANT/1/1
125	62/1/EQ1161/14
126	65/1/1//2/3
127	67/1/EQ2102/1
128	69/1/EQ4003
129	69/3//EQ4381
130	LOAD - 2
131	19/2/WALL & ROOF INSULATION
132	20/1/1/GRND FL OFFICES/1156/1//0//11
133	20/2/1/GUARD OFFICER/231/1//0//10.8
134	20/3/1/CELL BLOCK/459/1//0//10.8
135	20/4/1/DAY ROOM/334/1//0//10.8
136	20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
137	20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
138	20/7/1/OFFICER/127/1//0//11.2
139	20/8/1/GUARDS DORM/506/1//0//11.2
140	20/9/1/FIREMANS DORM/780/1//0//11.2
141	20/10/1/2ND FL OFFICE/220/1//0//11.2
142	20/11/2/PROVOST MARSHALL/182/1//0//11
143	20/12/2/NC0/110/1//0//11.2
144	20/13/2/GUARDS DORM/251/1//0//11.2
145	20/14/2/TOILETS/300/1//0//11.2
146	20/15/3/TRUCK ROOM/1280/1//0//14.7
147	21/M///CBADCTX///CBADHTX
148	22/1/1/YES////118
149	22/7/1/YES////130
150	22/8/1/YES////130
151	22/9/1/YES////130
152	22/10/1/YES////130
153	22/11/1/YES////130
154	22/12/1/YES////130
155	22/13/1/YES////130
156	22/14/1/YES////130
157	24/1/1/31/10//179/20
158	24/1/2/29/10//179/110
159	24/1/3/48/10//179/200
160	24/2/1/8/10//179/110
161	24/2/2/22/10//179/200
162	24/3/1/27/10//179/20
163	24/3/2/8/10//179/110
164	24/4/1/6/10//179/20
165	24/5/1/7/14.3//179/110
166	24/5/2/44/14.3//179/200
167	24/6/1/22/14.3//179/20
168	24/6/2/7/14.3//179/110
169	24/7/1/11/10.2//179/110
170	24/7/2/11/10.2//179/200
171	24/8/1/22/10.2//179/200
172	24/9/1/23/10.2//179/290
173	24/9/2/33/10.2//179/20
174	24/10/1/22/10.2//179/20

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LINE #	
175	24/10/2/10/10.2//179/110
176	24/11/1/17/10//179/20
177	24/12/1/10/10.2//179/200
178	24/13/1/10/10.2//179/200
179	24/13/2/24/10.2//179/290
180	24/14/1/26/10.2//179/110
181	24/15/1/43/14.3//179/290
182	24/15/2/33/14.3//179/20
183	25/1/1/4.5/2.5/5/.81/.64
184	25/1/2/4.5/2.5/2/.81/.64
185	25/1/3/4.5/2.5/4/.81/.64
186	25/2/1/4.5/2.5/1/.81/.64
187	25/2/2/4.5/2.5/1/.81/.64
188	25/3/1/4.5/2.5/2/.81/.64
189	25/3/2/4.5/2.5/1/.81/.64
190	25/4/1/4.5/2.5/1/.81/.64
191	25/5/1/6.5/2.5/1/.81/.64
192	25/5/2/55/1/1/.81/.64
193	25/6/1/6.5/2.5/2/.81/.64
194	25/6/2/6.5/2.5/1/.81/.64
195	25/7/1/5.5/2.5/1/.81/.64
196	25/7/2/5.5/2.5/1/.81/.64
197	25/8/1/5.5/2.5/2/.81/.64
198	25/9/1/5.5/2.5/2/.81/.64
199	25/9/2/5.5/2.5/3/.81/.64
200	25/10/1/5.5/2.5/2/.81/.64
201	25/10/2/5.5/2.5/1/.81/.64
202	25/11/1/4.5/2.5/2/.81/.64
203	25/12/1/5.5/2.5/1/.81/.64
204	25/13/1/5.5/2.5/1/.81/.64
205	25/13/2/5.5/2.5/2/.81/.64
206	25/14/1/5.5/2.5/2/.81/.64
207	25/15/1/74/1/1/1.04/1
208	25/15/2/4.5/2.5/3/.81/.64
209	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/OFF/OFF/OFF/OFF
210	27/M/340/SF-PERS/255/255/1.8/WATT-SF
211	29/1/////29/CFM-SF/.29/CFM-SF
212	29/2/////29/CFM-SF/.29/CFM-SF
213	29/3/////29/CFM-SF/.29/CFM-SF
214	29/4/////29/CFM-SF/.29/CFM-SF
215	29/5/////29/CFM-SF/.29/CFM-SF
216	29/6/////29/CFM-SF/.29/CFM-SF
217	29/7/////29/CFM-SF/.29/CFM-SF
218	29/8/////29/CFM-SF/.29/CFM-SF
219	29/9/////29/CFM-SF/.29/CFM-SF
220	29/10/////29/CFM-SF/.29/CFM-SF
221	29/11/////29/CFM-SF
222	29/12/////29/CFM-SF
223	29/13/////29/CFM-SF
224	29/14/////29/CFM-SF
225	29/15/////1.14/CFM-SF
226	31/4/1/32/10.3//147/SINE-FIT/80/50
227	SYSTEM - 2
228	39/2/WALL & ROOF INSULATION
229	40/1/PTAC
230	41/1/1/1
231	42/1/.2
232	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF



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LINE #	
233	40/2/RAD
234	41/2/1/2
235	42/2
236	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
237	40/3/UH
238	41/3/3/3
239	42/3//.1
240	45/3/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
241	EQUIPMENT - 2
242	59/2/CARLISLE///WALL & ROOF INSULATION
243	60/1/1/PKPLANT/1/1
244	62/1/EQ1161/14
245	65/1/1//2/3
246	67/1/EQ2102/1
247	69/1/EQ4003
248	69/3//EQ4381
249	LOAD - 3
250	19/3/WEATHERSTRIP & CAULKING
251	20/1/1/GRND FL OFFICES/1156/1//0//11
252	20/2/1/GUARD OFFICER/231/1//0//10.8
253	20/3/1/CELL BLOCK/459/1//0//10.8
254	20/4/1/DAY ROOM/334/1//0//10.8
255	20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
256	20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
257	20/7/1/OFFICER/127/1//0//11.2
258	20/8/1/GUARDS DORM/506/1//0//11.2
259	20/9/1/FIREMANS DORM/780/1//0//11.2
260	20/10/1/2ND FL OFFICE/220/1//0//11.2
261	20/11/2/PROVOST MARSHALL/182/1//0//11
262	20/12/2/NCO/110/1//0//11.2
263	20/13/2/GUARDS DORM/251/1//0//11.2
264	20/14/2/TOILETS/300/1//0//11.2
265	20/15/3/TRUCK ROOM/1280/1//0//14.7
266	21/M///CBADCTX///CBADHTX
267	22/1/1/YES////130
268	22/7/1/YES////130
269	22/8/1/YES////130
270	22/9/1/YES////130
271	22/10/1/YES////130
272	22/11/1/YES////130
273	22/12/1/YES////130
274	22/13/1/YES////130
275	22/14/1/YES////130
276	24/1/1/31/10//172/20
277	24/1/2/29/10//172/110
278	24/1/3/48/10//172/200
279	24/2/1/8/10//172/110
280	24/2/2/22/10//172/200
281	24/3/1/27/10//172/20
282	24/3/2/8/10//172/110
283	24/4/1/6/10//172/20
284	24/5/1/7/14.3//172/110
285	24/5/2/44/14.3//172/200
286	24/6/1/22/14.3//172/20
287	24/6/2/7/14.3//172/110
288	24/7/1/11/10.2//172/110
289	24/7/2/11/10.2//172/200
290	24/8/1/22/10.2//172/200

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LINE #	
291	24/9/1/23/10.2//172/290
292	24/9/2/33/10.2//172/20
293	24/10/1/22/10.2//172/20
294	24/10/2/10/10.2//172/110
295	24/11/1/17/10//172/20
296	24/12/1/10/10.2//172/200
297	24/13/1/10/10.2//172/200
298	24/13/2/24/10.2//172/290
299	24/14/1/26/10.2//172/110
300	24/15/1/43/14.3//172/290
301	24/15/2/33/14.3//172/20
302	25/1/1/4.5/2.5/5/.81/.64
303	25/1/2/4.5/2.5/2/.81/.64
304	25/1/3/4.5/2.5/4/.81/.64
305	25/2/1/4.5/2.5/1/.81/.64
306	25/2/2/4.5/2.5/1/.81/.64
307	25/3/1/4.5/2.5/2/.81/.64
308	25/3/2/4.5/2.5/1/.81/.64
309	25/4/1/4.5/2.5/1/.81/.64
310	25/5/1/6.5/2.5/1/.81/.64
311	25/5/2/55/1/1/.81/.64
312	25/6/1/6.5/2.5/2/.81/.64
313	25/6/2/6.5/2.5/1/.81/.64
314	25/7/1/5.5/2.5/1/.81/.64
315	25/7/2/5.5/2.5/1/.81/.64
316	25/8/1/5.5/2.5/2/.81/.64
317	25/9/1/5.5/2.5/2/.81/.64
318	25/9/2/5.5/2.5/3/.81/.64
319	25/10/1/5.5/2.5/2/.81/.64
320	25/10/2/5.5/2.5/1/.81/.64
321	25/11/1/4.5/2.5/2/.81/.64
322	25/12/1/5.5/2.5/1/.81/.64
323	25/13/1/5.5/2.5/1/.81/.64
324	25/13/2/5.5/2.5/2/.81/.64
325	25/14/1/5.5/2.5/2/.81/.64
326	25/15/1/74/1/1/1.04/1
327	25/15/2/4.5/2.5/3/.81/.64
328	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/OFF/OFF/OFF/OFF
329	27/M/340/SF-PERS/255/255/1.8/WATT-SF
330	29/1////////.34/CFM-SF/.34/CFM-SF
331	29/2////////.34/CFM-SF/.34/CFM-SF
332	29/3////////.34/CFM-SF/.34/CFM-SF
333	29/4////////.34/CFM-SF/.34/CFM-SF
334	29/5////////.34/CFM-SF/.34/CFM-SF
335	29/6////////.34/CFM-SF/.34/CFM-SF
336	29/7////////.34/CFM-SF/.34/CFM-SF
337	29/8////////.34/CFM-SF/.34/CFM-SF
338	29/9////////.34/CFM-SF/.34/CFM-SF
339	29/10////////.34/CFM-SF/.34/CFM-SF
340	29/11////////.34/CFM-SF
341	29/12////////.34/CFM-SF
342	29/13////////.34/CFM-SF
343	29/14////////.34/CFM-SF
344	29/15////////.64/CFM-SF
345	31/4/1/32/10.3//147/SINE-FIT/80/50
346	SYSTEM - 3
347	39/3/WEATHERSTRIP & CAULKING
348	40/1/PTAC

CONTENTS OF : E:\CB400.TM

LINE #	-----
349	41/1/1/1
350	42/1/.2
351	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
352	40/2/RAD
353	41/2/1/2
354	42/2
355	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
356	40/3/UH
357	41/3/3/3
358	42/3//.1
359	45/3/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
360	EQUIPMENT - 3
361	59/3/CARLISLE///WEATHERSTRIP & CAULKING
362	60/1/1/PKPLANT/1/1
363	62/1/EQ1161/14
364	65/1/1//2/3
365	67/1/EQ2102/1
366	69/1/EQ4003
367	69/3//EQ4381
368	LOAD - 4
369	19/4/REPLACE FLUORESCENT LAMPS
370	20/1/1/GRND FL OFFICES/1156/1//0//11
371	20/2/1/GUARD OFFICER/231/1//0//10.8
372	20/3/1/CELL BLOCK/459/1//0//10.8
373	20/4/1/DAY ROOM/334/1//0//10.8
374	20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
375	20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
376	20/7/1/OFFICER/127/1//0//11.2
377	20/8/1/GUARDS DORM/506/1//0//11.2
378	20/9/1/FIREMANS DORM/780/1//0//11.2
379	20/10/1/2ND FL OFFICE/220/1//0//11.2
380	20/11/2/PROVOST MARSHALL/182/1//0//11
381	20/12/2/NC0/110/1//0//11.2
382	20/13/2/GUARDS DORM/251/1//0//11.2
383	20/14/2/TOILETS/300/1//0//11.2
384	20/15/3/TRUCK ROOM/1280/1//0//14.7
385	21/M///CBADCTX///CBADHTX
386	22/1/1/YES////130
387	22/7/1/YES////130
388	22/8/1/YES////130
389	22/9/1/YES////130
390	22/10/1/YES////130
391	22/11/1/YES////130
392	22/12/1/YES////130
393	22/13/1/YES////130
394	22/14/1/YES////130
395	24/1/1/31/10//172/20
396	24/1/2/29/10//172/110
397	24/1/3/48/10//172/200
398	24/2/1/8/10//172/110
399	24/2/2/22/10//172/200
400	24/3/1/27/10//172/20
401	24/3/2/8/10//172/110
402	24/4/1/6/10//172/20
403	24/5/1/7/14.3//172/110
404	24/5/2/44/14.3//172/200
405	24/6/1/22/14.3//172/20
406	24/6/2/7/14.3//172/110

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LINE #	
407	24/7/1/11/10.2//172/110
408	24/7/2/11/10.2//172/200
409	24/8/1/22/10.2//172/200
410	24/9/1/23/10.2//172/290
411	24/9/2/33/10.2//172/20
412	24/10/1/22/10.2//172/20
413	24/10/2/10/10.2//172/110
414	24/11/1/17/10//172/20
415	24/12/1/10/10.2//172/200
416	24/13/1/10/10.2//172/200
417	24/13/2/24/10.2//172/290
418	24/14/1/26/10.2//172/110
419	24/15/1/43/14.3//172/290
420	24/15/2/33/14.3//172/20
421	25/1/1/4.5/2.5/5/.81/.64
422	25/1/2/4.5/2.5/2/.81/.64
423	25/1/3/4.5/2.5/4/.81/.64
424	25/2/1/4.5/2.5/1/.81/.64
425	25/2/2/4.5/2.5/1/.81/.64
426	25/3/1/4.5/2.5/2/.81/.64
427	25/3/2/4.5/2.5/1/.81/.64
428	25/4/1/4.5/2.5/1/.81/.64
429	25/5/1/6.5/2.5/1/.81/.64
430	25/5/2/55/1/1/.81/.64
431	25/6/1/6.5/2.5/2/.81/.64
432	25/6/2/6.5/2.5/1/.81/.64
433	25/7/1/5.5/2.5/1/.81/.64
434	25/7/2/5.5/2.5/1/.81/.64
435	25/8/1/5.5/2.5/2/.81/.64
436	25/9/1/5.5/2.5/2/.81/.64
437	25/9/2/5.5/2.5/3/.81/.64
438	25/10/1/5.5/2.5/2/.81/.64
439	25/10/2/5.5/2.5/1/.81/.64
440	25/11/1/4.5/2.5/2/.81/.64
441	25/12/1/5.5/2.5/1/.81/.64
442	25/13/1/5.5/2.5/1/.81/.64
443	25/13/2/5.5/2.5/2/.81/.64
444	25/14/1/5.5/2.5/2/.81/.64
445	25/15/1/74/1/1/1.04/1
446	25/15/2/4.5/2.5/3/.81/.64
447	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/OFF/OFF/OFF/OFF
448	27/M/340/SF-PERS/255/255/1.59/WATT-SF
449	29/1/////38/CFM-SF/.38/CFM-SF
450	29/2/////38/CFM-SF/.38/CFM-SF
451	29/3/////38/CFM-SF/.38/CFM-SF
452	29/4/////38/CFM-SF/.38/CFM-SF
453	29/5/////38/CFM-SF/.38/CFM-SF
454	29/6/////38/CFM-SF/.38/CFM-SF
455	29/7/////38/CFM-SF/.38/CFM-SF
456	29/8/////38/CFM-SF/.38/CFM-SF
457	29/9/////38/CFM-SF/.38/CFM-SF
458	29/10/////38/CFM-SF/.38/CFM-SF
459	29/11/////38/CFM-SF
460	29/12/////38/CFM-SF
461	29/13/////38/CFM-SF
462	29/14/////38/CFM-SF
463	29/15/////1.17/CFM-SF
464	31/4/1/32/10.3//147/SINE-FIT/80/50

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LINE # -----

465 SYSTEM - 4  
 466 39/4/REPLACE FLUORESCENT LAMPS  
 467 40/1/PTAC  
 468 41/1/1/1  
 469 42/1/.2  
 470 45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF  
 471 40/2/RAD  
 472 41/2/1/2  
 473 42/2  
 474 45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF  
 475 40/3/UH  
 476 41/3/3/3  
 477 42/3//.1  
 478 45/3/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF  
 479 EQUIPMENT - 4  
 480 59/4/CARLISLE///REPLACE FLUORESCENT LAMPS  
 481 60/1/1/PKPLANT/1/1  
 482 62/1/EQ1161/14  
 483 65/1/1//2/3  
 484 67/1/EQ2102/1  
 485 69/1/EQ4003  
 486 69/3//EQ4381

CONTENTS OF : E:\CB400B.TM

LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 400

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/REPLACE FLUORESCENT BALLASTS

13 20/1/1/GRND FL OFFICES/1156/1//0//11

14 20/2/1/GUARD OFFICER/231/1//0//10.8

15 20/3/1/CELL BLOCK/459/1//0//10.8

16 20/4/1/DAY ROOM/334/1//0//10.8

17 20/5/1/DAY ROOM 2ND FL/516/1//0//14.7

18 20/6/1/DAY ROOM 2ND FL/357/1//0//14.7

19 20/7/1/OFFICER/127/1//0//11.2

20 20/8/1/GUARDS DORM/506/1//0//11.2

21 20/9/1/FIREMANS DORM/780/1//0//11.2

22 20/10/1/2ND FL OFFICE/220/1//0//11.2

23 20/11/2/PROVOST MARSHALL/182/1//0//11

24 20/12/2/NCO/110/1//0//11.2

25 20/13/2/GUARDS DORM/251/1//0//11.2

26 20/14/2/TOILETS/300/1//0//11.2

27 20/15/3/TRUCK ROOM/1280/1//0//14.7

28 21/M////CBADCTX///CBADHTX

29 22/1/1/YES////130

30 22/7/1/YES////130

31 22/8/1/YES////130

32 22/9/1/YES////130

33 22/10/1/YES////130

34 22/11/1/YES////130

35 22/12/1/YES////130

36 22/13/1/YES////130

37 22/14/1/YES////130

38 24/1/1/31/10//172/20

39 24/1/2/29/10//172/110

40 24/1/3/48/10//172/200

41 24/2/1/8/10//172/110

42 24/2/2/22/10//172/200

43 24/3/1/27/10//172/20

44 24/3/2/8/10//172/110

45 24/4/1/6/10//172/20

46 24/5/1/7/14.3//172/110

47 24/5/2/44/14.3//172/200

48 24/6/1/22/14.3//172/20

49 24/6/2/7/14.3//172/110

50 24/7/1/11/10.2//172/110

51 24/7/2/11/10.2//172/200

52 24/8/1/22/10.2//172/200

53 24/9/1/23/10.2//172/290

54 24/9/2/33/10.2//172/20

55 24/10/1/22/10.2//172/20

56 24/10/2/10/10.2//172/110

57 24/11/1/17/10//172/20

58 24/12/1/10/10.2//172/200

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LINE #	
59	24/13/1/10/10.2//172/200
60	24/13/2/24/10.2//172/290
61	24/14/1/26/10.2//172/110
62	24/15/1/43/14.3//172/290
63	24/15/2/33/14.3//172/20
64	25/1/1/4.5/2.5/5/.81/.64
65	25/1/2/4.5/2.5/2/.81/.64
66	25/1/3/4.5/2.5/4/.81/.64
67	25/2/1/4.5/2.5/1/.81/.64
68	25/2/2/4.5/2.5/1/.81/.64
69	25/3/1/4.5/2.5/2/.81/.64
70	25/3/2/4.5/2.5/1/.81/.64
71	25/4/1/4.5/2.5/1/.81/.64
72	25/5/1/6.5/2.5/1/.81/.64
73	25/5/2/55/1/1/.81/.64
74	25/6/1/6.5/2.5/2/.81/.64
75	25/6/2/6.5/2.5/1/.81/.64
76	25/7/1/5.5/2.5/1/.81/.64
77	25/7/2/5.5/2.5/1/.81/.64
78	25/8/1/5.5/2.5/2/.81/.64
79	25/9/1/5.5/2.5/2/.81/.64
80	25/9/2/5.5/2.5/3/.81/.64
81	25/10/1/5.5/2.5/2/.81/.64
82	25/10/2/5.5/2.5/1/.81/.64
83	25/11/1/4.5/2.5/2/.81/.64
84	25/12/1/5.5/2.5/1/.81/.64
85	25/13/1/5.5/2.5/1/.81/.64
86	25/13/2/5.5/2.5/2/.81/.64
87	25/14/1/5.5/2.5/2/.81/.64
88	25/15/1/74/1/1/1.04/1
89	25/15/2/4.5/2.5/3/.81/.64
90	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/OFF/OFF/OFF/OFF
91	27/M/340/SF-PERS/255/255/1.35/WATT-SF
92	29/1/////38/CFM-SF/.38/CFM-SF
93	29/2/////38/CFM-SF/.38/CFM-SF
94	29/3/////38/CFM-SF/.38/CFM-SF
95	29/4/////38/CFM-SF/.38/CFM-SF
96	29/5/////38/CFM-SF/.38/CFM-SF
97	29/6/////38/CFM-SF/.38/CFM-SF
98	29/7/////38/CFM-SF/.38/CFM-SF
99	29/8/////38/CFM-SF/.38/CFM-SF
100	29/9/////38/CFM-SF/.38/CFM-SF
101	29/10/////38/CFM-SF/.38/CFM-SF
102	29/11////////38/CFM-SF
103	29/12////////38/CFM-SF
104	29/13////////38/CFM-SF
105	29/14////////38/CFM-SF
106	29/15////////1.17/CFM-SF
107	31/4/1/32/10.3//147/SINE-FIT/80/50
108	SYSTEM - 1
109	39/1/REPLACE FLUORESCENT BALLASTS
110	40/1/PTAC
111	41/1/1/1
112	42/1/.2
113	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
114	40/2/RAD
115	41/2/1/2
116	42/2

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LINE #	-----
117	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
118	40/3/UH
119	41/3/3/3
120	42/3//.1
121	45/3/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
122	EQUIPMENT - 1
123	59/1/CARLISLE///REPLACE FLUORESCENT BALLASTS
124	60/1/1/PKPLANT/1/1
125	62/1/EQ1161/14
126	65/1/1//2/3
127	67/1/EQ2102/1
128	69/1/EQ4003
129	69/3//EQ4381
130	LOAD - 2
131	19/2/REPLACE FLUORESCENT FIXTURES
132	20/1/1/GRND FL OFFICES/1156/1//0//11
133	20/2/1/GUARD OFFICER/231/1//0//10.8
134	20/3/1/CELL BLOCK/459/1//0//10.8
135	20/4/1/DAY ROOM/334/1//0//10.8
136	20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
137	20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
138	20/7/1/OFFICER/127/1//0//11.2
139	20/8/1/GUARDS DORM/506/1//0//11.2
140	20/9/1/FIREMANS DORM/780/1//0//11.2
141	20/10/1/2ND FL OFFICE/220/1//0//11.2
142	20/11/2/PROVOST MARSHALL/182/1//0//11
143	20/12/2/NCO/110/1//0//11.2
144	20/13/2/GUARDS DORM/251/1//0//11.2
145	20/14/2/TOILETS/300/1//0//11.2
146	20/15/3/TRUCK ROOM/1280/1//0//14.7
147	21/M////CBADCTX///CBADHTX
148	22/1/1/YES////130
149	22/7/1/YES////130
150	22/8/1/YES////130
151	22/9/1/YES////130
152	22/10/1/YES////130
153	22/11/1/YES////130
154	22/12/1/YES////130
155	22/13/1/YES////130
156	22/14/1/YES////130
157	24/1/1/31/10//172/20
158	24/1/2/29/10//172/110
159	24/1/3/48/10//172/200
160	24/2/1/8/10//172/110
161	24/2/2/22/10//172/200
162	24/3/1/27/10//172/20
163	24/3/2/8/10//172/110
164	24/4/1/6/10//172/20
165	24/5/1/7/14.3//172/110
166	24/5/2/44/14.3//172/200
167	24/6/1/22/14.3//172/20
168	24/6/2/7/14.3//172/110
169	24/7/1/11/10.2//172/110
170	24/7/2/11/10.2//172/200
171	24/8/1/22/10.2//172/200
172	24/9/1/23/10.2//172/290
173	24/9/2/33/10.2//172/20
174	24/10/1/22/10.2//172/20



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LINE #	
175	24/10/2/10/10.2//172/110
176	24/11/1/17/10//172/20
177	24/12/1/10/10.2//172/200
178	24/13/1/10/10.2//172/200
179	24/13/2/24/10.2//172/290
180	24/14/1/26/10.2//172/110
181	24/15/1/43/14.3//172/290
182	24/15/2/33/14.3//172/20
183	25/1/1/4.5/2.5/5/.81/.64
184	25/1/2/4.5/2.5/2/.81/.64
185	25/1/3/4.5/2.5/4/.81/.64
186	25/2/1/4.5/2.5/1/.81/.64
187	25/2/2/4.5/2.5/1/.81/.64
188	25/3/1/4.5/2.5/2/.81/.64
189	25/3/2/4.5/2.5/1/.81/.64
190	25/4/1/4.5/2.5/1/.81/.64
191	25/5/1/6.5/2.5/1/.81/.64
192	25/5/2/55/1/1/.81/.64
193	25/6/1/6.5/2.5/2/.81/.64
194	25/6/2/6.5/2.5/1/.81/.64
195	25/7/1/5.5/2.5/1/.81/.64
196	25/7/2/5.5/2.5/1/.81/.64
197	25/8/1/5.5/2.5/2/.81/.64
198	25/9/1/5.5/2.5/2/.81/.64
199	25/9/2/5.5/2.5/3/.81/.64
200	25/10/1/5.5/2.5/2/.81/.64
201	25/10/2/5.5/2.5/1/.81/.64
202	25/11/1/4.5/2.5/2/.81/.64
203	25/12/1/5.5/2.5/1/.81/.64
204	25/13/1/5.5/2.5/1/.81/.64
205	25/13/2/5.5/2.5/2/.81/.64
206	25/14/1/5.5/2.5/2/.81/.64
207	25/15/1/74/1/1/1.04/1
208	25/15/2/4.5/2.5/3/.81/.64
209	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/OFF/OFF/OFF/OFF
210	27/M/340/SF-PERS/255/255/1.14/WATT-SF
211	29/1/////38/CFM-SF/.38/CFM-SF
212	29/2/////38/CFM-SF/.38/CFM-SF
213	29/3/////38/CFM-SF/.38/CFM-SF
214	29/4/////38/CFM-SF/.38/CFM-SF
215	29/5/////38/CFM-SF/.38/CFM-SF
216	29/6/////38/CFM-SF/.38/CFM-SF
217	29/7/////38/CFM-SF/.38/CFM-SF
218	29/8/////38/CFM-SF/.38/CFM-SF
219	29/9/////38/CFM-SF/.38/CFM-SF
220	29/10/////38/CFM-SF/.38/CFM-SF
221	29/11/////38/CFM-SF
222	29/12/////38/CFM-SF
223	29/13/////38/CFM-SF
224	29/14/////38/CFM-SF
225	29/15/////1.17/CFM-SF
226	31/4/1/32/10.3//147/SINE-FIT/80/50
227	SYSTEM - 2
228	39/2/REPLACE FLUORESCENT FIXTURES
229	40/1/PTAC
230	41/1/1/1
231	42/1/.2
232	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF

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LINE #	-----
233	40/2/RAD
234	41/2/1/2
235	42/2
236	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
237	40/3/UH
238	41/3/3/3
239	42/3//.1
240	45/3/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
241	EQUIPMENT - 2
242	59/2/CARLISLE///REPLACE FLUORESCENT FIXTURES
243	60/1/1/PKPLANT/1/1
244	62/1/EQ1161/14
245	65/1/1//2/3
246	67/1/EQ2102/1
247	69/1/EQ4003
248	69/3//EQ4381
249	LOAD - 3
250	19/3/COMBINED ECOS
251	20/1/1/GRND FL OFFICES/1156/1//0//11
252	20/2/1/GUARD OFFICER/231/1//0//10.8
253	20/3/1/CELL BLOCK/459/1//0//10.8
254	20/4/1/DAY ROOM/334/1//0//10.8
255	20/5/1/DAY ROOM 2ND FL/516/1//0//14.7
256	20/6/1/DAY ROOM 2ND FL/357/1//0//14.7
257	20/7/1/OFFICER/127/1//0//11.2
258	20/8/1/GUARDS DORM/506/1//0//11.2
259	20/9/1/FIREMANS DORM/780/1//0//11.2
260	20/10/1/2ND FL OFFICE/220/1//0//11.2
261	20/11/2/PROVOST MARSHALL/182/1//0//11
262	20/12/2/NCO/110/1//0//11.2
263	20/13/2/GUARDS DORM/251/1//0//11.2
264	20/14/2/TOILETS/300/1//0//11.2
265	20/15/3/TRUCK ROOM/1280/1//0//14.7
266	21/M///CBADCTX///CBADHTX
267	22/1/1/YES////118
268	22/7/1/YES////130
269	22/8/1/YES////130
270	22/9/1/YES////130
271	22/10/1/YES////130
272	22/11/1/YES////130
273	22/12/1/YES////130
274	22/13/1/YES////130
275	22/14/1/YES////130
276	24/1/1/31/10//179/20
277	24/1/2/29/10//179/110
278	24/1/3/48/10//179/200
279	24/2/1/8/10//179/110
280	24/2/2/22/10//179/200
281	24/3/1/27/10//179/20
282	24/3/2/8/10//179/110
283	24/4/1/6/10//179/20
284	24/5/1/7/14.3//179/110
285	24/5/2/44/14.3//179/200
286	24/6/1/22/14.3//179/20
287	24/6/2/7/14.3//179/110
288	24/7/1/11/10.2//179/110
289	24/7/2/11/10.2//179/200
290	24/8/1/22/10.2//179/200

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LINE #	
291	24/9/1/23/10.2//179/290
292	24/9/2/33/10.2//179/20
293	24/10/1/22/10.2//179/20
294	24/10/2/10/10.2//179/110
295	24/11/1/17/10//179/20
296	24/12/1/10/10.2//179/200
297	24/13/1/10/10.2//179/200
298	24/13/2/24/10.2//179/290
299	24/14/1/26/10.2//179/110
300	24/15/1/43/14.3//179/290
301	24/15/2/33/14.3//179/20
302	25/1/1/4.5/2.5/5/.81/.64
303	25/1/2/4.5/2.5/2/.81/.64
304	25/1/3/4.5/2.5/4/.81/.64
305	25/2/1/4.5/2.5/1/.81/.64
306	25/2/2/4.5/2.5/1/.81/.64
307	25/3/1/4.5/2.5/2/.81/.64
308	25/3/2/4.5/2.5/1/.81/.64
309	25/4/1/4.5/2.5/1/.81/.64
310	25/5/1/6.5/2.5/1/.81/.64
311	25/5/2/55/1/1/.81/.64
312	25/6/1/6.5/2.5/2/.81/.64
313	25/6/2/6.5/2.5/1/.81/.64
314	25/7/1/5.5/2.5/1/.81/.64
315	25/7/2/5.5/2.5/1/.81/.64
316	25/8/1/5.5/2.5/2/.81/.64
317	25/9/1/5.5/2.5/2/.81/.64
318	25/9/2/5.5/2.5/3/.81/.64
319	25/10/1/5.5/2.5/2/.81/.64
320	25/10/2/5.5/2.5/1/.81/.64
321	25/11/1/4.5/2.5/2/.81/.64
322	25/12/1/5.5/2.5/1/.81/.64
323	25/13/1/5.5/2.5/1/.81/.64
324	25/13/2/5.5/2.5/2/.81/.64
325	25/14/1/5.5/2.5/2/.81/.64
326	25/15/1/74/1/1/1.04/1
327	25/15/2/4.5/2.5/3/.81/.64
328	26/M/CBADP&L/CBADP&L/OFF//OFF/CBADCLG/OFF/OFF/OFF/OFF
329	27/M/340/SF-PERS/255/255/1.14/WATT-SF
330	29/1/////25/CFM-SF/.25/CFM-SF
331	29/2/////25/CFM-SF/.25/CFM-SF
332	29/3/////25/CFM-SF/.25/CFM-SF
333	29/4/////25/CFM-SF/.25/CFM-SF
334	29/5/////25/CFM-SF/.25/CFM-SF
335	29/6/////25/CFM-SF/.25/CFM-SF
336	29/7/////25/CFM-SF/.25/CFM-SF
337	29/8/////25/CFM-SF/.25/CFM-SF
338	29/9/////25/CFM-SF/.25/CFM-SF
339	29/10/////25/CFM-SF/.25/CFM-SF
340	29/11////////.25/CFM-SF
341	29/12////////.25/CFM-SF
342	29/13////////.25/CFM-SF
343	29/14////////.25/CFM-SF
344	29/15////////.61/CFM-SF
345	31/4/1/32/10.3//147/SINE-FIT/80/50
346	SYSTEM - 3
347	39/3/COMBINED ECOS
348	40/1/PTAC

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LINE #	-----
349	41/1/1/1
350	42/1/.2
351	45/1/CBADCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
352	40/2/RAD
353	41/2/1/2
354	42/2
355	45/2/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
356	40/3/UH
357	41/3/3/3
358	42/3//.1
359	45/3/OFF/OFF/OFF/OFF/OFF/CBADHTG/OFF/OFF/OFF/OFF
360	EQUIPMENT - 3
361	59/3/CARLISLE///COMBINED ECOS
362	60/1/1/PKPLANT/1/1
363	62/1/EQ1161/14
364	65/1/1//2/3
365	67/1/EQ2102/1
366	69/1/EQ4003
367	69/3//EQ4381

*Building 400*  
*Trace Output File*

933702

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\*\* TRACE 600 ANALYSIS \*\*  
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\*\* by \*\*  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 400

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (8tu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (8tu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:18:43 1/27/94  
Dataset Name: CB400 .TM

AIRFLOW - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil.	Room
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Supply Airflow (Cfm)	Exhaust Airflow (Cfm)
1	PTAC	0	5.289	5,289	6,915	1,627	0	0
2	RAD	0	0	0	0	1,962	0	0
3	UH	0	0	1,944	0	1,272	0	0
Totals		0	5.289	7,232	6,915	4,861	0	0

CAPACITY - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	----- Cooling -----				----- Heating -----						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	13.4	0.0	0.0	13.4	-263,424	0	0	0	0	0	-263,424
2	RAD	0.0	0.0	0.0	0.0	-320,361	0	0	0	0	0	-320,361
3	UH	0.0	0.0	0.0	0.0	-120,567	0	0	0	0	0	-120,567
Totals		13.4	0.0	0.0	13.4	-704,352	0	0	0	0	0	-704,352

The building peaked at hour 16 month 7 with a capacity of 13.2 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
BASE BUILDING

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	----- Cooling -----				----- Heating -----		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.13	395.7	350.6	34.22	1.13	-56.22	4,686
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-57.94	5,529
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.52	-94.19	1,280

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	20,448	0		20,448	12.75	*	20,448	16.99	*	-26,370	-26,370	10.01
Glass Solar	15,990	0		15,990	9.97	*	15,971	13.27	*	0	0	0.00
Glass Cond	5,083	0		5,083	3.17	*	5,178	4.30	*	-25,537	-25,537	9.69
Wall Cond	25,132	0		25,132	15.67	*	26,404	21.94	*	-97,381	-97,381	36.97
Partition	237			237	0.15	*	237	0.20	*	-853	-853	0.32
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	64,931			64,931	40.49	*	27,521	22.87	*	-113,282	-113,282	43.00
Sub Total==>	131,821	0		131,821	82.20	*	95,760	79.58	*	-263,424	-263,424	100.00
Internal Loads												
Lights	21,448	0		21,448	13.37	*	21,688	18.02	*	0	0	0.00
People	6,354			6,354	3.96	*	2,891	2.40	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	27,803	0	0	27,803	17.34	*	24,579	20.42	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				752	0.47	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	159,624	0	0	160,376	100.00	*	120,339	100.00	*	-263,424	-263,424	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	13.4	160.4	119.4	5,289	75.1	62.6	67.0	54.0	52.1	56.2	4,686	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	330	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0	
Totals	13.4	160.4									2,789	0 0
											4,280	476 11

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA		Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent							
Main Htg	-263.4	5,289	68.0	113.8	Infil	1,627	1,627	Clg Cfm/Sqft	1.13	SADB	54.1	113.8
Aux Htg	0.0	0	0.0	0.0	Supply	5,289	5,289	Clg Cfm/Ton	395.71	Plenum	75.0	68.0
Preheat	-0.0	5,289	68.0	54.0	Mincfm	0	0	Clg Sqft/Ton	350.63	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	5,289	5,289	Clg Btuh/Sqft	34.22	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	14	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-263.4				Auxil	0	0	Htg Cfm/Sqft	1.13	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-56.22	Fn Frict	0.1	0.0



System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-34,341	-34,341	10.72
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	9.73
Wall Cond	0	0		0	0.00	*	0	0.00	*	-117,322	-117,322	36.62
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.27
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-136,678	-136,678	42.66
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-320,361	-320,361	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-320,361	-320,361	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%) Part
Main Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	5,529	330
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0	0
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	3,632	0
Totals	0.0	0.0				5,164	581 11

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-320.4	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,962	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-320.4				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-57.94	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	5.76
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062	20.79
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-88,558	-88,558	73.45
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-120,567	-120,567	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-120,567	-120,567	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	0	0 0
Totals	0.0	0.0				Wall	1,087	108 10

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-120.6	1,944	68.0	125.0	Vent	0	0	6lg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,272	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	1,944	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	1,944	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-120.6				Rm Exh	0	0	Htg Cfm/Sqft	1.52	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-94.19	Fn Frict	0.0	0.0

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceill.		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65

BUILDING AREAS - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GRND FL OFFICES	1 1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1 1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1 1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1 1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1 1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1 1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1 1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1 1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1 1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1 1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.			4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.			4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1 1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1 1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1 1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1 1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1 1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1 1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1 1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1 1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1 1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1 1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.			4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1 1	182	182	0	0	0	0	182	23	13	148
12	NCO	1 1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1 1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1 1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.			843	0	0	0	0	843	105	12	779
System	2 Total/Ave.			5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1 1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.			1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.			1,280	0	0	0	0	0	108	10	979
Building				11,495	659	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
BASE BUILDING

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.7	4	24	-35,218	13	262	361.6	0	0	0.0	0	0
5 - 10	1.3	10	67	-70,435	18	352	723.2	0	0	0.0	0	0
10 - 15	2.0	10	68	-105,653	26	507	1,084.8	0	0	0.0	0	0
15 - 20	2.7	6	37	-140,870	4	83	1,446.5	0	0	0.0	0	0
20 - 25	3.3	0	0	-176,088	1	25	1,808.1	0	0	0.0	0	0
25 - 30	4.0	7	45	-211,306	2	37	2,169.7	0	0	0.0	0	0
30 - 35	4.7	3	22	-246,523	0	4	2,531.3	0	0	0.0	0	0
35 - 40	5.3	6	38	-281,741	3	52	2,892.9	0	0	0.0	0	0
40 - 45	6.0	7	49	-316,958	0	8	3,254.5	0	0	0.0	0	0
45 - 50	6.7	7	49	-352,176	32	633	3,616.2	0	0	0.0	0	0
50 - 55	7.4	0	0	-387,393	0	0	3,977.8	0	0	0.0	0	0
55 - 60	8.0	2	15	-422,611	0	0	4,339.4	0	0	0.0	0	0
60 - 65	8.7	8	50	-457,829	0	0	4,701.0	0	0	0.0	0	0
65 - 70	9.4	1	5	-493,046	0	0	5,062.6	0	0	0.0	0	0
70 - 75	10.0	0	0	-528,264	0	0	5,424.2	100	1,070	0.0	0	0
75 - 80	10.7	0	0	-563,482	0	0	5,785.9	0	0	0.0	0	0
80 - 85	11.4	0	0	-598,699	0	0	6,147.5	0	0	0.0	0	0
85 - 90	12.0	2	15	-633,917	0	0	6,509.1	0	0	0.0	0	0
90 - 95	12.7	6	37	-669,134	0	0	6,870.7	0	0	0.0	0	0
95 - 100	13.4	22	145	-704,352	0	0	7,232.3	0	0	0.0	0	0
Hours Off	0.0	0	8,094	0	0	6,797	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
 BASE BUILDING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----			
Range	1	1	2	3
(F)				

Max. Temp.	83.1	93.0	94.7	93.8
Mo./Hr.	7 1	8 24	8 23	8 22
Day Type	5	1	1	1

	..... Number of Hours .....			
Above 100	0	0	0	0
95 - 100	0	0	0	0
90 - 95	0	1,119	1,296	1,240
85 - 90	0	988	1,336	1,194
80 - 85	483	821	296	318
75 - 80	2,320	545	744	248
70 - 75	807	615	306	456
65 - 70	566	2,087	2,095	216
60 - 65	336	1,453	1,448	416
55 - 60	1,224	480	518	604
50 - 55	630	652	721	843
Below 50	2,394	0	0	3,225

Min. Temp.	36.3	55.0	55.0	30.1
Mo./Hr.	2 8	1 17	1 13	2 10
Day Type	5	3	3	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING

----- M O N T H L Y   E N E R G Y   C O N S U M P T I O N -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	3,980	21	766	3
Feb	3,601	21	724	3
March	4,358	21	465	3
April	3,788	21	144	3
May	4,265	21	0	0
June	5,752	41	0	0
July	6,852	42	0	0
Aug	6,059	41	0	0
Sept	3,890	40	0	0
Oct	4,165	21	61	3
Nov	3,789	21	303	3
Dec	3,790	21	617	3
Total	54,290	42	3,081	3

Building Energy Consumption = 42,918 (Btu/Sq Ft/Year)  
Source Energy Consumption = 84,095 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)



## ----- EQUIPMENT ENERGY CONSUMPTION

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
BASE BUILDING

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility   ELECTRIC DEMAND

Peak Value        41.5    (kW)  
Yearly Time of Peak 15 (hr)   7 (mo)

Hour 15   Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	20.4	49.06
---	--------	----------------------------	------	-------

Sub Total			20.4	49.06
-----------	--	--	------	-------

Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.5	1.09
---	--	------------------------------------	-----	------

Sub Total			0.5	1.09
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Sub Total			0.0	0.00
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Miscellaneous

Lights			20.7	49.85
--------	--	--	------	-------

Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			20.7	49.85
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Grand Total			41.5	100.00
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**
**          T R A C E    6 0 0    A N A L Y S I S          **
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**          by          **
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 400

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:36:38 1/27/94  
Dataset Name: CB400 .TM

AIRFLOW - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil.	Room
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Supply Airflow (Cfm)	Exhaust Airflow (Cfm)
1	PTAC	0	3,730	3,730	4,971	1,241	0	0
2	RAD	0	0	0	0	1,498	0	0
3	UH	0	0	1,563	0	1,239	0	0
Totals		0	3,730	5,293	4,971	3,978	0	0

CAPACITY - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	9.7	0.0	0.0	9.7	-145,505	0	0	0	0	0	-145,505
2	RAD	0.0	0.0	0.0	0.0	-179,921	0	0	0	0	0	-179,921
3	UH	0.0	0.0	0.0	0.0	-96,955	0	0	0	0	0	-96,955
Totals		9.7	0.0	0.0	9.7	-422,381	0	0	0	0	0	-422,381

The building peaked at hour 16 month 7 with a capacity of 9.5 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	0.80	384.5	483.1	24.84	0.80	-31.05	4,686
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-32.54	5,529
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.22	-75.75	1,280

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	12,802	0		12,802	11.00	*	13,334	15.81	*	-18,204	-18,204	12.51
Glass Solar	15,990	0		15,990	13.74	*	16,028	19.00	*	0	0	0.00
Glass Cond	5,023	0		5,023	4.31	*	5,188	6.15	*	-25,537	-25,537	17.55
Wall Cond	3,790	0		3,790	3.26	*	3,869	4.59	*	-14,458	-14,458	9.94
Partition	237			237	0.20	*	237	0.28	*	-853	-853	0.59
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	50,410			50,410	43.30	*	21,221	25.16	*	-86,452	-86,452	59.42
Sub Total==>	88,252	0		88,252	75.81	*	59,877	71.00	*	-145,505	-145,505	100.00
Internal Loads												
Lights	21,306	0		21,306	18.30	*	21,585	25.59	*	0	0	0.00
People	6,320			6,320	5.43	*	2,873	3.41	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	27,626	0	0	27,626	23.73	*	24,459	29.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				530	0.46	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat PkUp		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	115,878	0	0	116,408	100.00	*	84,335	100.00	*	-145,505	-145,505	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	
Main Clg	9.7	116.4	83.4	3,730	75.1	62.9	68.5	54.1	52.1	56.2	Part	330
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	2,789
Totals	9.7	116.4									Wall	4,280
												476
												11

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA		Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	0.80	SADB	54.2	103.9
Main Htg	-145.5	3,730	68.0	103.9	Infil	1,241	1,241	Clg Cfm/Ton	384.47	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	3,730	3,730	Clg Sqft/Ton	483.06	Return	75.0	68.0
Preheat	-0.0	3,730	68.0	54.1	Mincfm	0	0	Clg Btuh/Sqft	24.84	Ret/OA	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	3,730	3,730	No. People	14	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.80	Fn BldTD	0.0	0.0
Total	-145.5				Auxil	0	0	Htg Btuh/Sqft	-31.05	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-26,174	-26,174	14.55
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	17.32
Wall Cond	0	0		0	0.00	*	0	0.00	*	-17,419	-17,419	9.68
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.47
Exposed floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-104,307	-104,307	57.97
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-179,921	-179,921	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-179,921	-179,921	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf) (%)	
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	Part	ExFlr
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	5,529	330	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0			
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0			
Totals	0.0	0.0								3,632	0	0
										5,164	581	11

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg % OA	0.0	Type	Clg	Htg
Main Htg	-179.9	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-179.9				Auxil	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-32.54	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	7.16
Wall Cond	0	0		0	0.00	*	0	0.00	*	-3,721	-3,721	3.84
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-86,288	-86,288	89.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-96,955	-96,955	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-96,955	-96,955	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf) (%)	
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	1,280	
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0 0
Totals	0.0	0.0								Wall	1,087	108 10

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
								Clg % OA	0.0	Type	Clg	Htg
Main Htg	-97.0	1,563	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,239	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	1,563	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	1,563	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-97.0				Rm Exh	0	0	Htg Cfm/Sqft	1.22	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-75.75	Fn Frict	0.0	0.0



BUILDING U-VALUES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.059	0.000	160.9	35.77
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	179.9	39.11
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	108.9	23.57
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	268.4	63.94
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	190.2	41.35
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	155.5	33.76
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	260.2	57.50
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	99.2	22.28
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	134.6	30.01
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	225.0	49.79
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.059	0.000	160.9	35.77
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	179.9	39.11
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	108.9	23.57
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	268.4	63.94
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	190.2	41.35
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	155.5	33.76
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	260.2	57.50
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	99.2	22.28
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	134.6	30.01
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	225.0	49.79
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	157.6	35.06
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	156.5	34.81
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	214.0	47.40
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	155.1	34.51
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	173.4	38.51
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.113	0.810	0.837	0.059	0.000	163.6	36.42
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87
Building		0.144	0.000	0.000	0.000	0.108	0.825	0.853	0.059	0.000	158.0	35.09

BUILDING AREAS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
Building					11,495	659	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.108 (Btu/Hr/Sq Ft/F)

Overall Wall U-Value = 0.144 (Btu/Hr/Sq Ft/F)

Overall Building U-Value = 0.130 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.74 (Btu/Hr/Sq Ft)

Wall Overall Thermal Transfer Value (OTTVw) = 11.07 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.5	0	0	-21,119	25	388	264.6	0	0	0.0	0	0
5 - 10	1.0	4	27	-42,238	15	233	529.3	0	0	0.0	0	0
10 - 15	1.5	4	22	-63,357	11	170	793.9	0	0	0.0	0	0
15 - 20	1.9	8	49	-84,476	2	25	1,058.5	0	0	0.0	0	0
20 - 25	2.4	10	62	-105,595	0	0	1,323.2	0	0	0.0	0	0
25 - 30	2.9	0	0	-126,714	0	0	1,587.8	0	0	0.0	0	0
30 - 35	3.4	6	38	-147,833	2	33	1,852.5	0	0	0.0	0	0
35 - 40	3.9	7	43	-168,952	2	24	2,117.1	0	0	0.0	0	0
40 - 45	4.4	9	56	-190,071	43	653	2,381.7	0	0	0.0	0	0
45 - 50	4.9	4	23	-211,190	0	0	2,646.4	0	0	0.0	0	0
50 - 55	5.3	11	67	-232,309	0	0	2,911.0	0	0	0.0	0	0
55 - 60	5.8	4	23	-253,428	0	0	3,175.6	0	0	0.0	0	0
60 - 65	6.3	0	0	-274,547	0	0	3,440.3	0	0	0.0	0	0
65 - 70	6.8	8	50	-295,667	0	0	3,704.9	0	0	0.0	0	0
70 - 75	7.3	5	34	-316,786	0	0	3,969.5	100	1,070	0.0	0	0
75 - 80	7.8	0	0	-337,905	0	0	4,234.2	0	0	0.0	0	0
80 - 85	8.2	0	0	-359,024	0	0	4,498.8	0	0	0.0	0	0
85 - 90	8.7	0	0	-380,143	0	0	4,763.5	0	0	0.0	0	0
90 - 95	9.2	3	19	-401,262	0	0	5,028.1	0	0	0.0	0	0
95 - 100	9.7	18	113	-422,381	0	0	5,292.7	0	0	0.0	0	0
Hours Off	0.0	0	8,134	0	0	7,234	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
 WALL & ROOF INSULATION

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----			
Range	1	1	2	3
(F)				

Max. Temp.	81.3	96.0	98.2	100.8
Mo./Hr.	7 22	8 18	8 23	8 19
Day Type	4	2	1	2

	..... Number of Hours .....			
Above 100	0	0	0	229
95 - 100	0	504	816	1,442
90 - 95	0	1,704	1,216	537
85 - 90	0	116	896	96
80 - 85	196	1,024	126	516
75 - 80	2,732	390	820	108
70 - 75	640	678	347	167
65 - 70	864	2,307	2,415	719
60 - 65	563	1,288	1,164	362
55 - 60	1,120	504	559	382
50 - 55	799	245	401	1,004
Below 50	1,846	0	0	3,198

Min. Temp.	39.4	55.0	55.0	30.3
Mo./Hr.	2 8	1 11	1 4	2 10
Day Type	5	4	4	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	3,978	21	374	2
Feb	3,599	21	396	2
March	4,356	21	233	2
April	3,787	21	59	2
May	4,235	21	0	0
June	4,970	34	0	0
July	6,029	36	0	0
Aug	5,749	35	0	0
Sept	4,056	35	0	0
Oct	4,165	21	1	0
Nov	3,787	21	141	2
Dec	3,788	21	281	2
Total	52,501	36	1,487	2

Building Energy Consumption = 28,524 (Btu/Sq Ft/Year)  
Source Energy Consumption = 64,017 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- EQUIPMENT ENERGY CONSUMPTION -----													
Ref	Equip	----- Monthly Consumption -----											
Num	Code	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
0	LIGHTS												
	ELEC	3976	3597	4354	3786	4165	4165	3786	4354	3786	4165	3786	3786
	PK	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7	20.7
1	MISC LD												
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD												
	GAS	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD												
	OIL	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD												
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD												
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD												
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS											
	ELEC	0	0	0	0	0	629	1931	1153	173	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	12.2	13.4	13.0	12.5	0.0	0.0	0.0
1	EQ5200	CONDENSER FANS											
	ELEC	0	0	0	0	0	62	188	100	18	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.7	1.3	0.9	0.7	0.0	0.0	0.0
1	EQ5303	CONTROLS											
	ELEC	0	0	0	0	0	44	60	69	14	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0
1	EQ4003	FC CENTRIF. FAN C.V.											
	ELEC	0	0	0	0	70	70	64	73	64	0	0	0
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0
2	EQ4381	PROPELLER FAN											
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ2102	PURCHASED DIST. HOT WATER											

47,709  
20.7

0  
0.0

0  
0.0

0  
0.0

0  
0.0

0  
0.0

0  
0.0

3,885  
13.4

368  
1.3

188  
0.3

342  
0.3

0  
0.0

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PAGE 27

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        35.9    (kW)  
Yearly Time of Peak 15 (hr)    7 (mo)

Hour 15    Month    7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	14.9	41.46
---	--------	----------------------------	------	-------

Sub Total			14.9	41.46
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	0.89
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Sub Total			0.3	0.89
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Sub Total			0.0	0.00
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Miscellaneous

Lights			20.7	57.65
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Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			20.7	57.65
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Grand Total			35.9	100.00
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*****  
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**  
**          T R A C E    6 0 0    A N A L Y S I S          **  
**  
**          by          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 400

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:54:55 1/27/94  
Dataset Name: CB400 .TM

AIRFLOW - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	PTAC	0	5,253	5,253	6,708	1,455	0	0
2	RAD	0	0	0	0	1,756	0	0
3	UH	0	0	1,297	0	696	0	0
Totals		0	5,253	6,550	6,708	3,907	0	0

CAPACITY - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	----- Cooling -----					----- Heating -----					
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	12.8	0.0	0.0	12.8	-251,499	0	0	0	0	0	-251,499
2	RAD	0.0	0.0	0.0	0.0	-305,974	0	0	0	0	0	-305,974
3	UH	0.0	0.0	0.0	0.0	-80,451	0	0	0	0	0	-80,451
Totals		12.8	0.0	0.0	12.8	-637,924	0	0	0	0	0	-637,924

The building peaked at hour 16 month 7 with a capacity of 12.7 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	----- Cooling -----				--- Heating ---		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.12	409.9	365.7	32.82	1.12	-53.67	4,686
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-55.34	5,529
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.01	-62.85	1,280

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)		Space Sensible (Btuh)	Perct Of Tot (%)		Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	20,448	0	0	20,448	13.30	*	20,448	17.41	*	-26,370	-26,370	10.49
Glass Solar	15,990	0	0	15,990	10.40	*	15,971	13.60	*	0	0	0.00
Glass Cond	5,083	0	0	5,083	3.31	*	5,178	4.41	*	-25,537	-25,537	10.15
Wall Cond	25,132	0	0	25,132	16.34	*	26,404	22.48	*	-97,381	-97,381	38.72
Partition	237	0	0	237	0.15	*	237	0.20	*	-853	-853	0.34
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	58,332	0	0	58,332	37.93	*	24,624	20.97	*	-101,358	-101,358	40.30
Sub Total==>	125,222	0	0	125,222	81.43	*	92,863	79.07	*	-251,499	-251,499	100.00
Internal Loads												
Lights	21,448	0	0	21,448	13.95	*	21,688	18.47	*	0	0	0.00
People	6,354	0	0	6,354	4.13	*	2,891	2.46	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	27,803	0	0	27,803	18.08	*	24,579	20.93	*	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				747	0.49	*		0.00	*		0	0.00
Ret. Fan Heat		0	0	0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0	0	0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	153,024	0	0	153,772	100.00	*	117,442	100.00	*	-251,499	-251,499	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%) Part
Main Clg	12.8	153.8	116.5	75.1 62.5 66.7	54.4 52.4 56.9	4,686	330
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	2,789
Totals	12.8	153.8				Wall	4,280

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Type	Heating Type	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-251.5	5,253	68.0	112.0	Vent	0	0	Clg Cfm/Sqft	1.12	SADB	54.5	112.0
Aux Htg	0.0	0	0.0	0.0	Infil	1,455	1,455	Clg Cfm/Ton	409.92	Plenum	75.0	68.0
Preheat	-0.0	5,253	68.0	54.3	Supply	5,253	5,253	Clg Sqft/Ton	365.69	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	32.82	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Return	5,253	5,253	No. People	14	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-251.5				Rm Exh	0	0	Htg Cfm/Sqft	1.12	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-53.67	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/0 \* Mo/Hr: 0/0 \* Mo/Hr: 13/1  
Outside Air ==> OADB/WB/HR: 0/0/0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-34,341	-34,341	11.22
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	10.19
Wall Cond	0	0		0	0.00	*	0	0.00	*	-117,322	-117,322	38.34
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.28
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-122,290	-122,290	39.97
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-305,974	-305,974	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-305,974	-305,974	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	5,529	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	330	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	3,632	0 0
Totals	0.0	0.0								Wall	5,164	581 11

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	ENGINEERING CHECKS--			TEMPERATURES (F)---		
								Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-306.0	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1	
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,756	Clg Cfm/Ton	0.00	Plenum	0.0	68.0	
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0	
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0	
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0	
Total	-306.0				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0	
					Auxil	0	0	Htg Btuh/Sqft	-55.34	Fn Frict	0.0	0.0	

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	8.63
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062	31.15
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-48,442	-48,442	60.21
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-80,451	-80,451	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-80,451	-80,451	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	1,280	
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0 0
Totals	0.0	0.0								Wall	1,087	108 10

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	--ENGINEERING CHECKS--			--TEMPERATURES (F)--		
								Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-80.5	1,297	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0	
Aux Htg	0.0	0	0.0	0.0	Infil	0	696	Clg Cfm/Ton	0.00	Plenum	0.0	68.0	
Preheat	0.0	0	0.0	0.0	Supply	0	1,297	Clg Sqft/Ton	0.00	Return	0.0	68.0	
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0	
Humidif	0.0	0	0.0	0.0	Return	0	1,297	No. People	0	Runarnd	0.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0	
Total	-80.5				Rm Exh	0	0	Htg Cfm/Sqft	1.01	Fn BldTD	0.0	0.0	
					Auxil	0	0	Htg Btuh/Sqft	-62.85	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G U - V A L U E S -----												
Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65

BUILDING AREAS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
Building					11,495	659	0	0	0	6,421	1,165	11	9,366



ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.6	1	8	-31,896	13	253	327.5	0	0	0.0	0	0
5 - 10	1.3	7	45	-63,792	16	302	655.0	0	0	0.0	0	0
10 - 15	1.9	18	122	-95,689	24	468	982.5	0	0	0.0	0	0
15 - 20	2.6	0	0	-127,585	8	155	1,310.0	0	0	0.0	0	0
20 - 25	3.2	0	0	-159,481	3	58	1,637.5	0	0	0.0	0	0
25 - 30	3.8	7	45	-191,377	0	0	1,964.9	0	0	0.0	0	0
30 - 35	4.5	6	41	-223,273	1	20	2,292.4	0	0	0.0	0	0
35 - 40	5.1	6	41	-255,170	2	36	2,619.9	0	0	0.0	0	0
40 - 45	5.8	9	60	-287,066	0	4	2,947.4	0	0	0.0	0	0
45 - 50	6.4	7	45	-318,962	33	641	3,274.9	0	0	0.0	0	0
50 - 55	7.0	0	0	-350,858	0	0	3,602.4	0	0	0.0	0	0
55 - 60	7.7	2	15	-382,754	0	0	3,929.9	0	0	0.0	0	0
60 - 65	8.3	5	35	-414,651	0	0	4,257.4	0	0	0.0	0	0
65 - 70	9.0	2	15	-446,547	0	0	4,584.9	0	0	0.0	0	0
70 - 75	9.6	1	8	-478,443	0	0	4,912.4	0	0	0.0	0	0
75 - 80	10.3	0	0	-510,339	0	0	5,239.9	0	0	0.0	0	0
80 - 85	10.9	0	0	-542,235	0	0	5,567.3	100	1,070	0.0	0	0
85 - 90	11.5	0	0	-574,132	0	0	5,894.8	0	0	0.0	0	0
90 - 95	12.2	0	0	-606,028	0	0	6,222.3	0	0	0.0	0	0
95 - 100	12.8	30	202	-637,924	0	0	6,549.8	0	0	0.0	0	0
Hours Off	0.0	0	8,078	0	0	6,823	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----			
Range (F)	1	1	2	3

Max. Temp.	83.2	93.0	94.7	93.8
Mo./Hr.	7	1	8	24
Day Type	5	1	1	1

	..... Number of Hours .....			
Above 100	0	0	0	0
95 - 100	0	0	0	0
90 - 95	0	1,119	1,296	1,240
85 - 90	0	988	1,336	1,302
80 - 85	525	821	296	210
75 - 80	2,314	579	744	272
70 - 75	823	589	374	486
65 - 70	529	2,151	2,073	349
60 - 65	369	1,413	1,450	297
55 - 60	1,207	473	495	950
50 - 55	641	627	696	525
Below 50	2,352	0	0	3,129

Min. Temp.	36.7	55.0	55.0	31.6
Mo./Hr.	2	8	1	18
Day Type	5	3	3	5

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	3,980	21	726	3
Feb	3,600	21	684	3
March	4,357	21	435	3
April	3,788	21	129	3
May	4,264	21	0	0
June	5,806	40	0	0
July	6,820	41	0	0
Aug	6,101	40	0	0
Sept	3,963	39	0	0
Oct	4,165	21	56	3
Nov	3,788	21	286	3
Dec	3,790	21	584	3
Total	54,422	41	2,900	3

Building Energy Consumption = 41,389 (Btu/Sq Ft/Year)  
Source Energy Consumption = 82,121 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 40.7 (kW)  
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	19.5	48.03
---	--------	----------------------------	------	-------

Sub Total			19.5	48.03
-----------	--	--	------	-------

Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.4	1.11
---	--	------------------------------------	-----	------

Sub Total			0.4	1.11
-----------	--	--	-----	------

Sub Total			0.0	0.00
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Miscellaneous

Lights			20.7	50.86
--------	--	--	------	-------

Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			20.7	50.86
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Grand Total			40.7	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 400

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 14:13:20 1/27/94  
Dataset Name: CB400 .TM



AIRFLOW - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil.	Room
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Supply Airflow (Cfm)	Exhaust Airflow (Cfm)
1	PTAC	0	5,179	5,179	6,806	1,627	0	0
2	RAD	0	0	0	0	1,962	0	0
3	UH	0	0	1,944	0	1,272	0	0
Totals		0	5,179	7,123	6,806	4,861	0	0

CAPACITY - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

		Cooling				Heating						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
System	System	Capacity	Capacity	Capacity	Totals	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Totals
Number	Type	(Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)
	1 PTAC	13.2	0.0	0.0	13.2	-263,424	0	0	0	0	0	-263,424
	2 RAD	0.0	0.0	0.0	0.0	-320,361	0	0	0	0	0	-320,361
	3 UH	0.0	0.0	0.0	0.0	-120,567	0	0	0	0	0	-120,567
Totals		13.2	0.0	0.0	13.2	-704,352	0	0	0	0	0	-704,352

The building peaked at hour 16 month 7 with a capacity of 13.0 tons

ENGINEERING CHECKS - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.11	393.5	356.0	33.71	1.11	-56.22	4,686
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-57.94	5,529
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.52	-94.19	1,280

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00		0	0.00		0	0	0.00
Skylite Cond	0	0		0	0.00		0	0.00		0	0	0.00
Roof Cond	20,448	0		20,448	12.95		20,448	17.36		-26,370	-26,370	10.01
Glass Solar	15,990	0		15,990	10.12		15,971	13.56		0	0	0.00
Glass Cond	5,083	0		5,083	3.22		5,178	4.40		-25,537	-25,537	9.69
Wall Cond	25,132	0		25,132	15.91		26,404	22.41		-97,381	-97,381	36.97
Partition	237			237	0.15		237	0.20		-853	-853	0.32
Exposed Floor	0			0	0.00		0	0.00		0	0	0.00
Infiltration	65,031			65,031	41.17		27,521	23.36		-113,282	-113,282	43.00
Sub Total==>	131,921	0		131,921	83.52		95,760	81.28		-263,424	-263,424	100.00
Internal Loads												
Lights	18,946	0		18,946	11.99		19,157	16.26		0	0	0.00
People	6,354			6,354	4.02		2,891	2.45		0	0	0.00
Misc	0	0	0	0	0.00		0	0.00		0	0	0.00
Sub Total==>	25,300	0	0	25,300	16.02		22,049	18.72		0	0	0.00
Ceiling Load	0	0		0	0.00		0	0.00		0	0	0.00
Outside Air	0	0	0	0	0.00		0	0.00		0	0	0.00
Sup. Fan Heat				737	0.47			0.00			0	0.00
Ret. Fan Heat		0		0	0.00			0.00			0	0.00
Duct Heat Pkup		0		0	0.00			0.00			0	0.00
OV/UNDR Sizing	0			0	0.00		0	0.00		0	0	0.00
Exhaust Heat		0	0	0	0.00			0.00			0	0.00
Terminal Bypass		0	0	0	0.00			0.00			0	0.00
Grand Total==>	157,222	0	0	157,958	100.00		117,809	100.00		-263,424	-263,424	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			AREAS		
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Gross Total	Glass (sf) (%)
Main Clg	13.2	158.0	116.8	5,179	75.1	62.6	67.3	54.0	52.1	56.3	Floor	4,686
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	330
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Totals	13.2	158.0									Roof	2,789
											Wall	4,280
												476 11

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	1.11	SADB	54.1	114.7
Main Htg	-263.4	5,179	68.0	114.7	Infil	1,627	1,627	Clg Cfm/Ton	393.46	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	5,179	5,179	Clg Sqft/Ton	355.99	Return	75.0	68.0
Preheat	-0.0	5,179	68.0	54.0	Mincfm	0	0	Clg Btuh/Sqft	33.71	Ret/OA	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	5,179	5,179	No. People	14	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	1.11	Fn BldTD	0.0	0.0
Total	-263.4				Auxil	0	0	Htg Btuh/SqFt	-56.22	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-34,341	-34,341	10.72
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	9.73
Wall Cond	0	0		0	0.00	*	0	0.00	*	-117,322	-117,322	36.62
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.27
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-136,678	-136,678	42.66
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-320,361	-320,361	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-320,361	-320,361	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	5,529	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	330	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	3,632	0 0
Totals	0.0	0.0				Wall	5,164	581 11

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-320.4	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,962	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-320.4				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-57.94	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Percent		Space	Percent		Space Peak	Coil Peak	Percent
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	5.76
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062	20.79
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-88,558	-88,558	73.45
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-120,567	-120,567	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-120,567	-120,567	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	0	0
Totals	0.0	0.0								Wall	1,087	108 10

-----AREAS-----

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg % OA	0.0	Type	Clg	Htg
Main Htg	-120.6	1,944	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	1,944	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	1,944	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-120.6				Auxil	0	0	Htg Cfm/SqFt	1.52	Fn 8ldTD	0.0	0.0
								Htg Btuh/SqFt	-94.19	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65

BUILDING AREAS - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Sk1 /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
Building					11,495	659	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.7	7	45	-35,218	13	261	356.1	0	0	0.0	0	0
5 - 10	1.3	10	67	-70,435	18	361	712.3	0	0	0.0	0	0
10 - 15	2.0	9	60	-105,653	25	502	1,068.4	0	0	0.0	0	0
15 - 20	2.6	0	0	-140,870	5	104	1,424.6	0	0	0.0	0	0
20 - 25	3.3	3	22	-176,088	0	4	1,780.7	0	0	0.0	0	0
25 - 30	3.9	4	23	-211,306	3	53	2,136.9	0	0	0.0	0	0
30 - 35	4.6	9	60	-246,523	0	9	2,493.0	0	0	0.0	0	0
35 - 40	5.3	1	4	-281,741	1	16	2,849.2	0	0	0.0	0	0
40 - 45	5.9	11	71	-316,958	2	40	3,205.3	0	0	0.0	0	0
45 - 50	6.6	4	23	-352,176	32	637	3,561.5	0	0	0.0	0	0
50 - 55	7.2	0	0	-387,393	0	0	3,917.6	0	0	0.0	0	0
55 - 60	7.9	5	30	-422,611	0	0	4,273.8	0	0	0.0	0	0
60 - 65	8.6	6	40	-457,829	0	0	4,629.9	0	0	0.0	0	0
65 - 70	9.2	0	0	-493,046	0	0	4,986.1	0	0	0.0	0	0
70 - 75	9.9	0	0	-528,264	0	0	5,342.2	100	1,070	0.0	0	0
75 - 80	10.5	0	0	-563,481	0	0	5,698.4	0	0	0.0	0	0
80 - 85	11.2	2	15	-598,699	0	0	6,054.5	0	0	0.0	0	0
85 - 90	11.8	0	0	-633,917	0	0	6,410.7	0	0	0.0	0	0
90 - 95	12.5	6	37	-669,134	0	0	6,766.8	0	0	0.0	0	0
95 - 100	13.2	23	145	-704,352	0	0	7,123.0	0	0	0.0	0	0
Hours Off	0.0	0	8,118	0	0	6,773	0.0	0	7,690	0.0	0	8,760



BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4  
 REPLACE FLUORESCENT LAMPS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----			
Range	* 1	1	2	3
(F)				

Max. Temp.	83.1	92.6	94.4	93.3
Mo./Hr.	7 1	8 23	8 23	8 22
Day Type	5	1	1	1

	..... Number of Hours .....			
Above 100	0	0	0	0
95 - 100	0	0	0	0
90 - 95	0	1,044	1,248	1,232
85 - 90	0	939	1,374	944
80 - 85	483	945	306	566
75 - 80	2,301	492	744	250
70 - 75	791	664	221	428
65 - 70	589	2,079	2,169	252
60 - 65	348	1,461	1,459	412
55 - 60	1,200	480	518	573
50 - 55	637	656	721	875
Below 50	2,411	0	0	3,228

Min. Temp.	36.2	55.0	55.0	30.0
Mo./Hr.	2 8	1 16	1 13	2 11
Day Type	5	3	3	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	HOT WTR On Peak (Therm)	HOT W DMND On Peak (Thrm/hr)
Jan	3,516	18	772	3
Feb	3,181	18	730	3
March	3,850	18	473	3
April	3,347	18	153	3
May	3,777	19	0	0
June	5,186	38	0	0
July	6,337	39	0	0
Aug	5,463	38	0	0
Sept	3,433	37	0	0
Oct	3,680	18	63	3
Nov	3,347	18	311	3
Dec	3,349	18	623	3
Total	48,465	39	3,124	3

Building Energy Consumption = 41,571 (Btu/Sq Ft/Year)  
Source Energy Consumption = 79,415 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION -----

[illegible]

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 38.8 (kW)  
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
Cooling Equipment				
1	EQ1161	AIR-CLD COND COMP <15 TONS	20.0	51.71
Sub Total			20.0	51.71
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.4	1.14
Sub Total			0.4	1.14
Sub Total			0.0	0.00
Miscellaneous				
	Lights		18.3	47.14
	Base Utilities		0.0	0.00
	Misc Equipment		0.0	0.00
Sub Total			18.3	47.14
Grand Total			38.8	100.00

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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 400

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:10:56 1/27/94  
Dataset Name: CB4008 .TM

AIRFLOW - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply	Room Exhaust
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Airflow (Cfm)	Airflow (Cfm)
1	PTAC	0	5,090	5,090	6,716	1,627	0	0
2	RAD	0	0	0	0	1,962	0	0
3	UH	0	0	1,944	0	1,272	0	0
Totals		0	5,090	7,034	6,716	4,861	0	0

CAPACITY - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling					Heating					
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	12.9	0.0	0.0	12.9	-263,424	0	0	0	0	0	-263,424
2	RAD	0.0	0.0	0.0	0.0	-320,361	0	0	0	0	0	-320,361
3	UH	0.0	0.0	0.0	0.0	-120,567	0	0	0	0	0	-120,567
Totals		12.9	0.0	0.0	12.9	-704,352	0	0	0	0	0	-704,352

The building peaked at hour 16 month 7 with a capacity of 12.7 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.09	394.8	363.5	33.01	1.09	-56.22	4,686
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-57.94	5,529
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.52	-94.19	1,280

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)		Space Sensible (Btuh)	Perct Of Tot (%)		Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	20,448	0		20,448	13.22	*	20,448	17.79	*	-26,370	-26,370	10.01
Glass Solar	15,990	0		15,990	10.34	*	15,971	13.90	*	0	0	0.00
Glass Cond	5,083	0		5,083	3.29	*	5,178	4.51	*	-25,537	-25,537	9.69
Wall Cond	25,132	0		25,132	16.25	*	26,404	22.98	*	-97,381	-97,381	36.97
Partition	237			237	0.15	*	237	0.21	*	-853	-853	0.32
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	64,641			64,641	41.79	*	27,521	23.95	*	-113,282	-113,282	43.00
Sub Total==>	131,531	0		131,531	85.03	*	95,760	83.33	*	-263,424	-263,424	100.00
Internal Loads												
Lights	16,086	0		16,086	10.40	*	16,266	14.15	*	0	0	0.00
People	6,354			6,354	4.11	*	2,891	2.52	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	22,441	0	0	22,441	14.51	*	19,157	16.67	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				724	0.47	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	153,971	0	0	154,695	100.00	*	114,917	100.00	*	-263,424	-263,424	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	4,686	
Main Clg	12.9	154.7	114.0	75.1	62.7	67.7	54.2	52.2	56.6	Part	330	
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	2,789	0 0
Totals	12.9	154.7								Wall	4,280	476 11

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA		Type	Clg	Htg
					Vent	0	0		0.0			
Main Htg	-263.4	5,090	68.0	115.6	Infil	1,627	1,627	Clg Cfm/Sqft	1.09	SADB	54.3	115.6
Aux Htg	0.0	0	0.0	0.0	Supply	5,090	5,090	Clg Cfm/Ton	394.82	Plenum	75.0	68.0
Preheat	-0.0	5,090	68.0	54.1	Mincfm	0	0	Clg Sqft/Ton	363.50	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	5,090	5,090	Clg Btuh/Sqft	33.01	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	14	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-263.4				Auxil	0	0	Htg Cfm/Sqft	1.09	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-56.22	Fn Frict	0.1	0.0



System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-34,341	-34,341	10.72
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	9.73
Wall Cond	0	0		0	0.00	*	0	0.00	*	-117,322	-117,322	36.62
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.27
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-136,678	-136,678	42.66
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-320,361	-320,361	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-320,361	-320,361	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf) (%)	
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	Part	ExFlr
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	5,529	330	0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0			
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0			
Totals	0.0	0.0								3,632	581	11

-----AREAS-----

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	ENGINEERING CHECKS--		TEMPERATURES (F)---		
	(Mbh)	(cfm)	Deg F	Deg F				Clg % OA	0.0	Type	Clg	Htg
Main Htg	-320.4	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,962	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-320.4				Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-57.94	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	5.76
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062	20.79
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-88,558	-88,558	73.45
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-120,567	-120,567	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-120,567	-120,567	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Floor	1,280	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Exflr	0	
Totals	0.0	0.0				Roof	0	0 0
						Wall	1,087	108 10

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-120.6	1,944	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,272	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	1,944	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	1,944	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-120.6				Rm Exh	0	0	Htg Cfm/Sqft	1.52	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-94.19	Fn Frict	0.0	0.0

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65

BUILDING AREAS - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate Flr   Rm		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
Building					11,495	659	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.6	6	41	-35,218	13	261	351.7	0	0	0.0	0	0
5 - 10	1.3	20	127	-70,435	18	366	703.4	0	0	0.0	0	0
10 - 15	1.9	0	0	-105,653	24	485	1,055.0	0	0	0.0	0	0
15 - 20	2.6	0	0	-140,870	6	121	1,406.7	0	0	0.0	0	0
20 - 25	3.2	7	45	-176,088	0	4	1,758.4	0	0	0.0	0	0
25 - 30	3.9	0	0	-211,306	1	17	2,110.1	0	0	0.0	0	0
30 - 35	4.5	9	60	-246,523	2	36	2,461.7	0	0	0.0	0	0
35 - 40	5.2	4	26	-281,741	0	9	2,813.4	0	0	0.0	0	0
40 - 45	5.8	11	72	-316,958	3	56	3,165.1	0	0	0.0	0	0
45 - 50	6.4	0	0	-352,176	32	637	3,516.8	0	0	0.0	0	0
50 - 55	7.1	0	0	-387,393	0	0	3,868.4	0	0	0.0	0	0
55 - 60	7.7	5	35	-422,611	0	0	4,220.1	0	0	0.0	0	0
60 - 65	8.4	5	35	-457,829	0	0	4,571.8	0	0	0.0	0	0
65 - 70	9.0	0	0	-493,046	0	0	4,923.5	0	0	0.0	0	0
70 - 75	9.7	0	0	-528,264	0	0	5,275.1	100	1,070	0.0	0	0
75 - 80	10.3	2	15	-563,481	0	0	5,626.8	0	0	0.0	0	0
80 - 85	11.0	0	0	-598,699	0	0	5,978.5	0	0	0.0	0	0
85 - 90	11.6	0	0	-633,917	0	0	6,330.2	0	0	0.0	0	0
90 - 95	12.2	6	37	-669,134	0	0	6,681.8	0	0	0.0	0	0
95 - 100	12.9	23	145	-704,352	0	0	7,033.5	0	0	0.0	0	0
Hours Off	0.0	0	8,122	0	0	6,768	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
 REPLACE FLUORESCENT BALLASTS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----			
Range	1	1	2	3
(F)				

Max. Temp.	83.0	92.2	94.1	92.7
Mo./Hr.	7 23	8 24	8 24	8 21
Day Type	4	1	1	1

	..... Number of Hours .....			
Above 100	0	0	0	0
95 - 100	0	0	0	0
90 - 95	0	714	1,240	1,220
85 - 90	0	1,199	1,377	680
80 - 85	441	1,015	311	827
75 - 80	2,329	474	744	253
70 - 75	752	661	187	404
65 - 70	610	2,091	2,160	288
60 - 65	364	1,459	1,502	408
55 - 60	1,209	491	518	530
50 - 55	610	656	721	919
Below 50	2,445	0	0	3,231

Min. Temp.	36.0	55.0	55.0	30.0
Mo./Hr.	2 10	1 16	1 13	2 10
Day Type	5	3	3	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	2,986	16	778	3
Feb	2,702	16	736	3
March	3,269	16	482	3
April	2,842	16	162	3
May	3,220	16	0	0
June	4,536	35	0	0
July	5,744	36	0	0
Aug	4,773	35	0	0
Sept	2,927	34	0	0
Oct	3,124	16	66	3
Nov	2,842	16	319	3
Dec	2,844	16	629	3
Total	41,807	36	3,173	3

Building Energy Consumption = 40,013 (Btu/Sq Ft/Year)  
Source Energy Consumption = 74,043 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)



## EQUIPMENT ENERGY CONSUMPTION

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 35.6 (kW)  
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
Cooling Equipment				
1	EQ1161	AIR-CLD COND COMP <15 TONS	19.6	55.17
Sub Total			19.6	55.17
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	0.4	1.22
Sub Total			0.4	1.22
Sub Total			0.0	0.00
Miscellaneous				
	Lights		15.5	43.61
	Base Utilities		0.0	0.00
	Misc Equipment		0.0	0.00
Sub Total			15.5	43.61
Grand Total			35.6	100.00

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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 400

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:28:54 1/27/94  
Dataset Name: CB400B .TM

AIRFLOW - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	PTAC	0	5,028	5,028	6,655	1,627	0	0
2	RAD	0	0	0	0	1,962	0	0
3	UH	0	0	1,944	0	1,272	0	0
Totals		0	5,028	6,972	6,655	4,861	0	0

CAPACITY - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

		Cooling				Heating						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
System	System	Capacity	Capacity	Capacity	Totals	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Totals
Number	Type	(Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)
	1 PTAC	12.6	0.0	0.0	12.6	-263,424	0	0	0	0	0	-263,424
	2 RAD	0.0	0.0	0.0	0.0	-320,361	0	0	0	0	0	-320,361
	3 UH	0.0	0.0	0.0	0.0	-120,567	0	0	0	0	0	-120,567
Totals		12.6	0.0	0.0	12.6	-704,352	0	0	0	0	0	-704,352

The building peaked at hour 16 month 7 with a capacity of 12.5 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	1.07	398.4	371.2	32.32	1.07	-56.22	4,686
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-57.94	5,529
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.52	-94.19	1,280

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)		Space Sensible (Btuh)	Perct Of Tot (%)		Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	20,448	0	0	20,448	13.50	*	20,448	18.19	*	-26,370	-26,370	10.01
Glass Solar	15,990	0	0	15,990	10.56	*	15,971	14.21	*	0	0	0.00
Glass Cond	5,083	0	0	5,083	3.36	*	5,178	4.61	*	-25,537	-25,537	9.69
Wall Cond	25,132	0	0	25,132	16.59	*	26,404	23.49	*	-97,381	-97,381	36.97
Partition	237	0	0	237	0.16	*	237	0.21	*	-853	-853	0.32
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	63,925	0	0	63,925	42.20	*	27,521	24.49	*	-113,282	-113,282	43.00
Sub Total==>	130,816	0	0	130,816	86.36	*	95,760	85.21	*	-263,424	-263,424	100.00
Internal Loads												
Lights	13,584	0	0	13,584	8.97	*	13,735	12.22	*	0	0	0.00
People	6,354	0	0	6,354	4.20	*	2,891	2.57	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	19,938	0	0	19,938	13.16	*	16,627	14.79	*	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				715	0.47	*		0.00	*		0	0.00
Ret. Fan Heat		0	0	0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0	0	0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	150,754	0	0	151,469	100.00	*	112,387	100.00	*	-263,424	-263,424	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	12.6	151.5	111.5	75.1 62.8 68.1	54.4 52.4 57.0	4,686		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	330		
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	12.6	151.5				2,789	0	0
						4,280	476	11

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-263.4	5,028	68.0	116.1	Vent	0	0	Clg Cfm/Sqft	1.07	SADB	54.5	116.1
Aux Htg	0.0	0	0.0	0.0	Infil	1,627	1,627	Clg Cfm/Ton	398.36	Plenum	75.0	68.0
Preheat	-0.0	5,028	68.0	54.3	Supply	5,028	5,028	Clg Sqft/Ton	371.24	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	32.32	Ret/OA	75.0	68.0
Humidif	0.0	0	0.0	0.0	Return	5,028	5,028	No. People	14	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-263.4				Rm Exh	0	0	Htg Cfm/Sqft	1.07	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-56.22	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-34,341	-34,341	10.72
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	9.73
Wall Cond	0	0		0	0.00	*	0	0.00	*	-117,322	-117,322	36.62
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.27
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-136,678	-136,678	42.66
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-320,361	-320,361	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-320,361	-320,361	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	5,529	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	330	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	3,632	0 0
Totals	0.0	0.0								Wall	5,164	581 11

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	AIRFLOWS (cfm)		--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
						Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-320.4	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,962	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-320.4				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-57.94	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	5.76
Wall Cond	0	0		0	0.00	*	0	0.00	*	-25,062	-25,062	20.79
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-88,558	-88,558	73.45
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-120,567	-120,567	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-120,567	-120,567	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%) Part ExFlr Roof Wall
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	1,280	0 0 0
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0	0 0 0
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	0	0 0 0
Totals	0.0	0.0				1,087	108 10

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-120.6	1,944	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,272	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	1,944	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	1,944	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-120.6				Rm Exh	0	0	Htg Cfm/SqFt	1.52	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-94.19	Fn Frict	0.0	0.0



BUILDING U-VALUES - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceill.		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	157.9	35.17
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	177.0	38.53
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	107.2	23.23
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	268.1	63.86
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	187.1	40.73
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.400	0.000	153.0	33.27
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	256.5	56.75
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	98.2	22.09
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	133.0	29.70
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	221.8	49.16
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	159.7	35.60
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	155.7	34.67
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	154.5	34.42
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	211.1	46.81
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	153.2	34.13
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	171.1	38.06
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.148	0.810	0.837	0.400	0.000	161.4	35.97
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.400	0.000	117.5	25.50
Building		0.144	0.000	0.000	0.000	0.148	0.825	0.853	0.400	0.000	155.8	34.65

BUILDING AREAS - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1	1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1	1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1	1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1	1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1	1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1	1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1	1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1	1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1	1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1	1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.				4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1	1	182	182	0	0	0	0	182	23	13	148
12	NCO	1	1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1	1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1	1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.				843	0	0	0	0	843	105	12	779
System	2 Total/Ave.				5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1	1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.				1,280	0	0	0	0	0	108	10	979
Building					11,495	659	0	0	0	6,421	1,165	11	9,366

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.148 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.447 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.334 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 8.49 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 12.45 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.6	16	96	-35,218	13	257	348.6	0	0	0.0	0	0
5 - 10	1.3	7	45	-70,435	19	370	697.2	0	0	0.0	0	0
10 - 15	1.9	0	0	-105,653	23	466	1,045.8	0	0	0.0	0	0
15 - 20	2.5	0	0	-140,870	7	140	1,394.4	0	0	0.0	0	0
20 - 25	3.2	7	45	-176,088	0	0	1,743.0	0	0	0.0	0	0
25 - 30	3.8	4	22	-211,306	0	4	2,091.6	0	0	0.0	0	0
30 - 35	4.4	7	42	-246,523	2	37	2,440.2	0	0	0.0	0	0
35 - 40	5.0	8	49	-281,741	1	20	2,788.8	0	0	0.0	0	0
40 - 45	5.7	7	45	-316,958	1	21	3,137.4	0	0	0.0	0	0
45 - 50	6.3	0	0	-352,176	34	677	3,486.0	0	0	0.0	0	0
50 - 55	6.9	2	15	-387,393	0	0	3,834.6	0	0	0.0	0	0
55 - 60	7.6	6	35	-422,611	0	0	4,183.2	0	0	0.0	0	0
60 - 65	8.2	3	20	-457,829	0	0	4,531.8	0	0	0.0	0	0
65 - 70	8.8	0	0	-493,046	0	0	4,880.4	0	0	0.0	0	0
70 - 75	9.5	2	15	-528,264	0	0	5,229.0	100	1,070	0.0	0	0
75 - 80	10.1	0	0	-563,482	0	0	5,577.6	0	0	0.0	0	0
80 - 85	10.7	0	0	-598,699	0	0	5,926.2	0	0	0.0	0	0
85 - 90	11.4	0	0	-633,917	0	0	6,274.8	0	0	0.0	0	0
90 - 95	12.0	6	37	-669,134	0	0	6,623.4	0	0	0.0	0	0
95 - 100	12.6	24	145	-704,352	0	0	6,972.0	0	0	0.0	0	0
Hours Off	0.0	0	8,149	0	0	6,768	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
 REPLACE FLUORESCENT FIXTURES

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----			
Range	1	1	2	3
(F)				

Max. Temp.	83.0	91.8	93.7	92.3
Mo./Hr.	7 23	8 23	8 23	8 24
Day Type	4	1	1	1

	..... Number of Hours .....			
Above 100	0	0	0	0
95 - 100	0	0	0	0
90 - 95	0	594	1,232	1,147
85 - 90	0	1,288	1,375	485
80 - 85	441	1,046	321	1,080
75 - 80	2,325	438	744	260
70 - 75	739	663	179	376
65 - 70	619	2,105	2,146	324
60 - 65	356	1,462	1,497	289
55 - 60	1,218	508	549	608
50 - 55	583	656	726	912
Below 50	2,479	0	0	3,279
Min. Temp.	35.9	55.0	55.0	30.0
Mo./Hr.	2 9	1 16	1 13	2 10
Day Type	5	3	3	4

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	2,522	13	784	3
Feb	2,282	13	741	3
March	2,761	13	489	3
April	2,400	13	171	3
May	2,733	14	0	0
June	3,961	31	0	0
July	5,223	33	0	0
Aug	4,167	32	0	0
Sept	2,484	31	0	0
Oct	2,638	13	68	3
Nov	2,400	13	327	3
Dec	2,402	13	635	3
Total	35,973	33	3,215	3

Building Energy Consumption = 38,654 (Btu/Sq Ft/Year)  
Source Energy Consumption = 69,343 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	2518	2278	2758	2398	2638	2638	2398	2758	2398	2638	2398	2398	30,216
	PK	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161	AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	0	1081	2441	1160	0	0	0	0	4,683
	PK	0.0	0.0	0.0	0.0	0.0	16.8	17.5	17.0	16.3	0.0	0.0	0.0	17.5
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	0	89	238	96	0	0	0	0	422
	PK	0.0	0.0	0.0	0.0	0.0	1.0	1.6	1.2	0.7	0.0	0.0	0.0	1.6
1	EQ5303	CONTROLS												
	ELEC	0	0	0	0	0	58	60	54	0	0	0	0	172
	PK	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4003	FC CENTRIF. FAN C.V.												
	ELEC	0	0	0	0	95	95	86	99	86	0	0	0	461
	PK	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.4
2	EQ4381	PROPELLER FAN												
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ2102	PURCHASED DIST. HOT WATER												

[illegible]



UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 32.8 (kW)  
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-OLD COND COMP <15 TONS	19.2	58.69
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Sub Total			19.2	58.69
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.4	1.31
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Sub Total			0.4	1.31
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Sub Total			0.0	0.00
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Miscellaneous

Lights			13.1	40.00
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Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			13.1	40.00
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Grand Total			32.8	100.00
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**
**          T R A C E    6 0 0    A N A L Y S I S          **
**
**          by          **
**
*****
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 400

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:47: 7 1/27/94  
Dataset Name: CB4008 .TM

AIRFLOW - ALTERNATIVE 3  
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil.	Room
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Supply Airflow (Cfm)	Exhaust Airflow (Cfm)
1	PTAC	0	3,245	3,245	4,315	1,070	0	0
2	RAD	0	0	0	0	1,291	0	0
3	UH	0	0	916	0	663	0	0
Totals		0	3,245	4,161	4,315	3,024	0	0

CAPACITY - ALTERNATIVE 3  
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	PTAC	8.5	0.0	0.0	8.5	-133,581	0	0	0	0	0	-133,581
2	RAD	0.0	0.0	0.0	0.0	-165,534	0	0	0	0	0	-165,534
3	UH	0.0	0.0	0.0	0.0	-56,839	0	0	0	0	0	-56,839
Totals		8.5	0.0	0.0	8.5	-355,953	0	0	0	0	0	-355,953

The building peaked at hour 16 month 7 with a capacity of 8.3 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
COMBINED ECOS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	PTAC	0.00	0.69	381.1	550.4	21.80	0.69	-28.51	4,686
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-29.94	5,529
3	Main	UH	0.00	0.00	0.0	0.0	0.00	0.72	-44.41	1,280

```
***** COOLING COIL PEAK ***** CLG SPACE PEAK ***** HEATING COIL PEAK *****
Peaked at Time ==>           Mo/Hr: 7/16           *           Mo/Hr: 7/16           *           Mo/Hr: 13/ 1
Outside Air ==>           OADB/WB/HR: 91/ 73/ 98.0   *           OADB: 91           *           OADB: 4
```

COOLING COIL SELECTION											AREAS		
	Total Capacity		Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains			
Main Clg	8.5	102.2	72.7	3,245	75.1	63.0	69.0	54.1	52.1	56.4	Floor	4,686	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	330	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Totals	8.5	102.2									Roof	2,789	0 0
											Wall	4,280	476 11

-----HEATING COIL SELECTION-----					-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	0.69	SADB	54.2	105.8
Main Htg	-133.6	3,245	68.0	105.8	Infil	1,070	1,070	Clg Cfm/Ton	381.12	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	3,245	3,245	Clg Sqft/Ton	550.35	Return	75.0	68.0
Preheat	-0.0	3,245	68.0	54.1	Mincfm	0	0	Clg Btuh/Sqft	21.80	Ret/OA	75.0	68.0
Reheat	0.0	0	0.0	0.0	Return	3,245	3,245	No. People	14	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.69	Fn BldTD	0.0	0.0
Total	-133.6				Auxil	0	0	Htg Btuh/SqFt	-28.51	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-26,174	-26,174	15.81
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-31,168	-31,168	18.83
Wall Cond	0	0		0	0.00	*	0	0.00	*	-17,419	-17,419	10.52
Partition	0			0	0.00	*	0	0.00	*	-853	-853	0.52
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-89,919	-89,919	54.32
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-165,534	-165,534	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-165,534	-165,534	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	5,529	
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	330	
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	0	
Totals	0.0	0.0				Wall	3,632	0 0
							5,164	581 11

-----HEATING COIL SELECTION-----

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-165.5	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SAOB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,291	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-165.5				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-29.94	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,946	-6,946	12.22
Wall Cond	0	0		0	0.00	*	0	0.00	*	-3,721	-3,721	6.55
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-46,171	-46,171	81.23
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-56,839	-56,839	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-56,839	-56,839	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	1,280		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	0.0	0.0				1,087	108	10

-----AREAS-----

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-56.8	916	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	663	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	916	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	916	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-56.8				Rm Exh	0	0	Htg Cfm/Sqft	0.72	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-44.41	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 3  
COMBINED ECOS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.059	0.000	160.9	35.77
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	179.9	39.11
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	108.9	23.57
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	268.4	63.94
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	190.2	41.35
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	155.5	33.76
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	260.2	57.50
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	99.2	22.28
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	134.6	30.01
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	225.0	49.79
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04
System	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04
1	GRND FL OFFICES	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.059	0.000	160.9	35.77
2	GUARD OFFICER	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	179.9	39.11
3	CELL BLOCK	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	108.9	23.57
4	DAY ROOM	0.144	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	268.4	63.94
5	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	190.2	41.35
6	DAY ROOM 2ND FL	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.059	0.000	155.5	33.76
7	OFFICER	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	260.2	57.50
8	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	99.2	22.28
9	FIREMANS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	134.6	30.01
10	2ND FL OFFICE	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	225.0	49.79
Zone	1 Total/Ave.	0.144	0.000	0.000	0.000	0.102	0.810	0.837	0.059	0.000	161.9	36.04
11	PROVOST MARSHALL	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	157.6	35.06
12	NCO	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	156.5	34.81
13	GUARDS DORM	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	214.0	47.40
14	TOILETS	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	155.1	34.51
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.148	0.810	0.837	0.059	0.000	173.4	38.51
System	2 Total/Ave.	0.144	0.000	0.000	0.000	0.113	0.810	0.837	0.059	0.000	163.6	36.42
15	TRUCK ROOM	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87
System	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.968	1.008	0.059	0.000	119.4	25.87
Building		0.144	0.000	0.000	0.000	0.108	0.825	0.853	0.059	0.000	158.0	35.09

BUILDING AREAS - ALTERNATIVE 3  
COMBINED ECOS

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GRND FL OFFICES	1 1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1 1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1 1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1 1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1 1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1 1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1 1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1 1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1 1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1 1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.			4,686	330	0	0	0	2,789	476	11	3,804
System	1 Total/Ave.			4,686	330	0	0	0	2,789	476	11	3,804
1	GRND FL OFFICES	1 1	1,156	1,156	0	0	0	0	1,156	124	11	956
2	GUARD OFFICER	1 1	231	231	0	0	0	0	0	23	8	278
3	CELL BLOCK	1 1	459	459	0	0	0	0	0	34	10	316
4	DAY ROOM	1 1	334	334	330	0	0	0	0	11	19	49
5	DAY ROOM 2ND FL	1 1	516	516	0	0	0	0	0	71	10	658
6	DAY ROOM 2ND FL	1 1	357	357	0	0	0	0	0	49	12	366
7	OFFICER	1 1	127	127	0	0	0	0	127	28	12	197
8	GUARDS DORM	1 1	506	506	0	0	0	0	506	28	12	197
9	FIREMANS DORM	1 1	780	780	0	0	0	0	780	69	12	502
10	2ND FL OFFICE	1 1	220	220	0	0	0	0	220	41	13	285
Zone	1 Total/Ave.			4,686	330	0	0	0	2,789	476	11	3,804
11	PROVOST MARSHALL	1 1	182	182	0	0	0	0	182	23	13	148
12	NCO	1 1	110	110	0	0	0	0	110	14	13	88
13	GUARDS DORM	1 1	251	251	0	0	0	0	251	41	12	306
14	TOILETS	1 1	300	300	0	0	0	0	300	28	10	238
Zone	2 Total/Ave.			843	0	0	0	0	843	105	12	779
System	2 Total/Ave.			5,529	330	0	0	0	3,632	581	11	4,583
15	TRUCK ROOM	1 1	1,280	1,280	0	0	0	0	0	108	10	979
Zone	3 Total/Ave.			1,280	0	0	0	0	0	108	10	979
System	3 Total/Ave.			1,280	0	0	0	0	0	108	10	979
Building				11,495	659	0	0	0	6,421	1,165	11	9,366



ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
COMBINED ECOS

----- A S H R A E 9 0 A N A L Y S I S -----

Overall Roof U-Value = 0.108 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.144 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.130 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.74 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 11.07 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.4	5	23	-17,798	22	343	208.1	0	0	0.0	0	0
5 - 10	0.9	1	4	-35,595	12	179	416.1	0	0	0.0	0	0
10 - 15	1.3	9	47	-53,393	10	160	624.2	0	0	0.0	0	0
15 - 20	1.7	10	50	-71,191	3	51	832.3	0	0	0.0	0	0
20 - 25	2.1	0	0	-88,988	1	17	1,040.3	0	0	0.0	0	0
25 - 30	2.6	0	0	-106,786	0	4	1,248.4	0	0	0.0	0	0
30 - 35	3.0	9	43	-124,584	1	16	1,456.5	0	0	0.0	0	0
35 - 40	3.4	4	19	-142,381	2	36	1,664.6	0	0	0.0	0	0
40 - 45	3.8	8	38	-160,179	1	23	1,872.6	0	0	0.0	0	0
45 - 50	4.3	1	4	-177,977	46	706	2,080.7	0	0	0.0	0	0
50 - 55	4.7	11	54	-195,774	0	0	2,288.8	0	0	0.0	0	0
55 - 60	5.1	0	0	-213,572	0	0	2,496.8	0	0	0.0	0	0
60 - 65	5.5	6	30	-231,369	0	0	2,704.9	0	0	0.0	0	0
65 - 70	6.0	6	30	-249,167	0	0	2,913.0	0	0	0.0	0	0
70 - 75	6.4	5	23	-266,965	0	0	3,121.0	0	0	0.0	0	0
75 - 80	6.8	0	0	-284,762	0	0	3,329.1	100	1,070	0.0	0	0
80 - 85	7.2	0	0	-302,560	0	0	3,537.2	0	0	0.0	0	0
85 - 90	7.7	0	0	-320,358	0	0	3,745.2	0	0	0.0	0	0
90 - 95	8.1	5	23	-338,155	0	0	3,953.3	0	0	0.0	0	0
95 - 100	8.5	23	114	-355,953	0	0	4,161.4	0	0	0.0	0	0
Hours Off	0.0	0	8,258	0	0	7,225	0.0	0	7,690	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
 COMBINED ECOS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----			
Range	1	1	2	3
(F)				

Max. Temp.	81.3	93.4	96.4	96.8
Mo./Hr.	7 21	8 20	8 22	8 18
Day Type	4	2	1	2

	..... Number of Hours .....			
Above 100	0	0	0	0
95 - 100	0	0	476	1,007
90 - 95	0	1,419	1,451	1,051
85 - 90	0	801	731	174
80 - 85	197	1,031	338	390
75 - 80	2,731	317	816	391
70 - 75	561	848	409	395
65 - 70	729	2,179	2,400	454
60 - 65	770	1,431	1,200	554
55 - 60	926	529	567	415
50 - 55	1,013	205	372	1,117
Below 50	1,833	0	0	2,812
Min. Temp.	39.6	55.0	55.0	31.9
Mo./Hr.	2 9	1 16	1 6	2 8
Day Type	5	4	4	5

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	HOT WTR	HOT W DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	2,520	13	349	2
Feb	2,280	13	367	2
March	2,759	13	262	2
April	2,399	13	66	2
May	2,699	13	0	0
June	2,872	25	0	0
July	4,369	26	0	0
Aug	3,923	26	0	0
Sept	2,547	25	0	0
Oct	2,638	13	1	0
Nov	2,399	13	152	2
Dec	2,400	13	269	2
Total	33,805	26	1,465	2

Building Energy Consumption = 22.783 (Btu/Sq Ft/Year)  
Source Energy Consumption = 47,109 (Btu/Sq Ft/Year)

Floor Area = 11,495 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION -----

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS ELEC PK	2518 13.1	2278 13.1	2758 13.1	2398 13.1	2638 13.1	2638 13.1	2398 13.1	2758 13.1	2398 13.1	2638 13.1	2398 13.1	2398 13.1	30,216 13.1
1	MISC LD ELEC PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
2	MISC LD GAS PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
3	MISC LD OIL PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
4	MISC LD P STEAM PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
5	MISC LD P HOTH2O PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
6	MISC LD P CHILL PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
1	EQ1161 ELEC PK	AIR-CLD COND COMP <15 TONS												2,866 11.8
		0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	149 10.7	1691 11.8	950 11.4	76 11.0	0 0.0	0 0.0	0 0.0	
1	EQ5200 ELEC PK	CONDENSER FANS												267 1.1
		0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	13 0.6	164 1.1	82 0.8	8 0.6	0 0.0	0 0.0	0 0.0	
1	EQ5303 ELEC PK	CONTROLS												151 0.3
		0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	12 0.3	60 0.3	69 0.3	10 0.3	0 0.0	0 0.0	0 0.0	
1	EQ4003 ELEC PK	FC CENTRIF. FAN C.V.												297 0.3
		0 0.0	0 0.0	0 0.0	0 0.0	61 0.3	61 0.3	56 0.3	64 0.3	56 0.3	0 0.0	0 0.0	0 0.0	
2	EQ4381 ELEC PK	PROPELLER FAN												0 0.0
		0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	
1	EQ2102	PURCHASED DIST. HOT WATER												

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
COMBINED ECOS

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility   ELECTRIC DEMAND

Peak Value        26.5    (kW)  
Yearly Time of Peak 15 (hr)   7 (mo)

Hour 15   Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	13.1	49.44
Sub Total			13.1	49.44
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	1.05
Sub Total			0.3	1.05
Sub Total			0.0	0.00

Miscellaneous

Lights	13.1	49.51
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	13.1	49.51
Grand Total	26.5	100.00

*Building 420*  
*Trace Input File*

933702



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LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 420

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/BASE BUILDING

13 20/01/01/GND FLR CLG/3372/1/2/1.0//10.1

14 20/02/02/GRN FLR HTG/2720/1/2/1.0//10.1

15 20/03/03/1ST FLR DORM/4598/1/2/1.33/1.6/11.5

16 20/04/04/1ST FLR HTG/1700/1/2/1.33/1.6/11.5

17 20/05/05/2ND FLR DORM/4598/1/2/1.83/1.6/11.5

18 20/06/06/2ND FLR HTG/1700/1/2/1.83/1.6/11.5

19 21/M////CBLQTX///CBLQTX

20 24/01/1/770/1//136/37

21 24/01/2/1005/1//136/127

22 24/01/3/565/1//136/217

23 24/02/1/350/1//136/127

24 24/02/2/210/1//136/217

25 24/03/1/896/1//136/37

26 24/03/2/1568/1//136/127

27 24/03/3/897/1//136/217

28 24/03/4/1128/1//136/307

29 24/04/1/196/1//136/127

30 24/04/2/552/1//136/307

31 24/05/1/896/1//136/37

32 24/05/2/1568/1//136/127

33 24/05/3/897/1//136/217

34 24/05/4/552/1//136/307

35 24/06/1/196/1//136/127

36 24/06/2/552/1//136/307

37 25/01/1/68/1/1/.55/.57

38 25/01/2/136/1/1/.55/.57/3

39 25/01/3/57/1/1/.55/.57

40 25/02/1/45/1/1/.55/.57/3

41 25/03/1/99/1/1/.55/.57

42 25/03/2/213/1/1/.55/.57/4

43 25/03/3/99/1/1/0.55/0.57

44 25/03/4/170/1/1/.55/.57

45 25/04/2/75/1/1/0.55/0.57/4

46 25/05/1/99/1/1/0.55/0.57

47 25/05/2/213/1/1/0.55/0.57

48 25/05/3/99/1/1/0.55/0.57

49 25/05/4/170/1/1/0.55/0.57

50 25/06/2/70/1/1/0.55/0.57

51 26/M/CBLQP/CBLQL/CBLQFAN//OFF/CBLQFAN/OFF/OFF/CBLQP/OFF

52 27/M/359/SF-PERS/230/190/.5/WATT-SF/INCAND

53 29/M/.091/CFM-SF/.091/CFM-SF/.27/CFM-SF/.27/CFM-SF

54 30/01/3900/CFM/3900/CFM/////1325/CFM

55 30/03/4500/CFM/4500/CFM/////1325/CFM

56 30/05/5000/CFM/5000/CFM/////1325/CFM

57 31/01/1/310/1//138/CONSTANT/65/45

58 31/02/1/1140/1//138/CONSTANT/65/45

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LINE #	-----
59	31/05/1/4302/1//137/HRLYOADB
60	31/06/1/1700/1//137/HRLYOADB
61	33/3/4.5/.75/12.5
62	33/4/6.5/1.0/12.5
63	SYSTEM - 1
64	39/1/BASE BUILDING
65	40/1/FC
66	41/1/01/01/03/03/05/05
67	42/1/0.5/0.5////0.5
68	45/1/CBLQCLG/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
69	48/1////35.7/TONS
70	49/1/792/MBH
71	40/2/RAD
72	41/2/02/02/04/04/06/06
73	42/2//////0.5
74	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
75	49/2/68/MBH
76	EQUIPMENT - 1
77	59/1/CARLISLE//BASE BUILDING
78	60/1/1/BLKPLANT/1/1
79	62/1/EQ1121L/1/35.7/TONS/1.32/KW-TON
80	63/1/5/HP
81	65/1/1//1/2
82	67/1/EQ2101/1/5/HP/860/MBH
83	69/1/EQ4003////EQ4003
84	LOAD - 2
85	19/2/WALL & ROOF INSULATION
86	20/01/01/GND FLR CLG/3372/1/2/1.0//10.1
87	20/02/02/GRN FLR HTG/2720/1/2/1.0//10.1
88	20/03/03/1ST FLR DORM/4598/1/2/1.33/1.6/11.5
89	20/04/04/1ST FLR HTG/1700/1/2/1.33/1.6/11.5
90	20/05/05/2ND FLR DORM/4598/1/2/1.83/1.6/11.5
91	20/06/06/2ND FLR HTG/1700/1/2/1.83/1.6/11.5
92	21/M////CBLQTX///CBLQTX
93	24/01/1/770/1//115/37
94	24/01/2/1005/1//115/127
95	24/01/3/565/1//115/217
96	24/02/1/350/1//115/127
97	24/02/2/210/1//115/217
98	24/03/1/896/1//115/37
99	24/03/2/1568/1//115/127
100	24/03/3/897/1//115/217
101	24/03/4/1128/1//115/307
102	24/04/1/196/1//115/127
103	24/04/2/552/1//115/307
104	24/05/1/896/1//115/37
105	24/05/2/1568/1//115/127
106	24/05/3/897/1//115/217
107	24/05/4/552/1//115/307
108	24/06/1/196/1//115/127
109	24/06/2/552/1//115/307
110	25/01/1/68/1/1/.55/.57
111	25/01/2/136/1/1/.55/.57/3
112	25/01/3/57/1/1/.55/.57
113	25/02/1/45/1/1/.55/.57/3
114	25/03/1/99/1/1/.55/.57
115	25/03/2/213/1/1/.55/.57/4
116	25/03/3/99/1/1/0.55/0.57

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LINE #	
117	25/03/4/170/1/1/.55/.57
118	25/04/2/75/1/1/0.55/0.57/4
119	25/05/1/99/1/1/0.55/0.57
120	25/05/2/213/1/1/0.55/0.57
121	25/05/3/99/1/1/0.55/0.57
122	25/05/4/170/1/1/0.55/0.57
123	25/06/2/70/1/1/0.55/0.57
124	26/M/CBLQP/CBLQL/CBLQFAN//OFF/CBLQFAN/OFF/OFF/CBLQP/OFF
125	27/M/359/SF-PERS/230/190/.5/WATT-SF/INCAND
126	29/M/.091/CFM-SF/.091/CFM-SF/.20/CFM-SF/.20/CFM-SF
127	30/01/3900/CFM/3900/CFM/////1325/CFM
128	30/03/4500/CFM/4500/CFM/////1325/CFM
129	30/05/5000/CFM/5000/CFM/////1325/CFM
130	31/01/1/310/1//115/CONSTANT/65/45
131	31/02/1/1140/1//115/CONSTANT/65/45
132	31/05/1/4302/1//116/HRLYOADB
133	31/06/1/1700/1//116/HRLYOADB
134	33/3/4.5/.75/12.5
135	33/4/6.5/1.0/12.5
136	SYSTEM - 2
137	39/2/WALL & ROOF INSULATION
138	40/1/FC
139	41/1/01/01/03/03/05/05
140	42/1/0.5/0.5///0.5
141	45/1/CBLQCLG/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
142	48/1////35.7/TONS
143	49/1/792/MBH
144	40/2/RAD
145	41/2/02/02/04/04/06/06
146	42/2////0.5
147	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
148	49/2/68/MBH
149	EQUIPMENT - 2
150	59/2/CARLISLE///WALL & ROOF INSULATION
151	60/1/1/BLKPLANT/1/1
152	62/1/EQ1121L/1/35.7/TONS/1.32/KW-TON
153	63/1/5/HP
154	65/1/1//1/2
155	67/1/EQ2101/1/5/HP/860/MBH
156	69/1/EQ4003////EQ4003
157	LOAD - 3
158	19/3/VESTIBULE
159	20/01/01/GND FLR CLG/3372/1/2/1.0//10.1
160	20/02/02/GRN FLR HTG/2720/1/2/1.0//10.1
161	20/03/03/1ST FLR DORM/4598/1/2/1.33/1.6/11.5
162	20/04/04/1ST FLR HTG/1700/1/2/1.33/1.6/11.5
163	20/05/05/2ND FLR DORM/4598/1/2/1.83/1.6/11.5
164	20/06/06/2ND FLR HTG/1700/1/2/1.83/1.6/11.5
165	21/M////CBLQTX///CBLQTX
166	24/01/1/770/1//136/37
167	24/01/2/1005/1//136/127
168	24/01/3/565/1//136/217
169	24/02/1/350/1//136/127
170	24/02/2/210/1//136/217
171	24/03/1/896/1//136/37
172	24/03/2/1568/1//136/127
173	24/03/3/897/1//136/217
174	24/03/4/1128/1//136/307.

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LINE #	-----
175	24/04/1/196/1//136/127
176	24/04/2/552/1//136/307
177	24/05/1/896/1//136/37
178	24/05/2/1568/1//136/127
179	24/05/3/897/1//136/217
180	24/05/4/552/1//136/307
181	24/06/1/196/1//136/127
182	24/06/2/552/1//136/307
183	25/01/1/68/1/1/.55/.57
184	25/01/2/136/1/1/.55/.57/3
185	25/01/3/57/1/1/.55/.57
186	25/02/1/45/1/1/.55/.57/3
187	25/03/1/99/1/1/.55/.57
188	25/03/2/213/1/1/.55/.57/4
189	25/03/3/99/1/1/0.55/0.57
190	25/03/4/170/1/1/.55/.57
191	25/04/2/75/1/1/0.55/0.57/4
192	25/05/1/99/1/1/0.55/0.57
193	25/05/2/213/1/1/0.55/0.57
194	25/05/3/99/1/1/0.55/0.57
195	25/05/4/170/1/1/0.55/0.57
196	25/06/2/70/1/1/0.55/0.57
197	26/M/CBLQP/CBLQL/CBLQFAN//OFF/CBLQFAN/OFF/OFF/CBLQP/OFF
198	27/M/359/SF-PERS/230/190/.5/WATT-SF/INCAND
199	29/M/.091/CFM-SF/.091/CFM-SF/.26/CFM-SF/.26/CFM-SF
200	30/01/3900/CFM/3900/CFM/////1325/CFM
201	30/03/4500/CFM/4500/CFM/////1325/CFM
202	30/05/5000/CFM/5000/CFM/////1325/CFM
203	31/01/1/310/1//138/CONSTANT/65/45
204	31/02/1/1140/1//138/CONSTANT/65/45
205	31/05/1/4302/1//137/HRLYOADB
206	31/06/1/1700/1//137/HRLYOADB
207	33/3/4.5/.75/12.5
208	33/4/6.5/1.0/12.5
209	SYSTEM - 3
210	39/3/VESTIBULE
211	40/1/FC
212	41/1/01/01/03/03/05/05
213	42/1/0.5/0.5////0.5
214	45/1/CBLQCLG/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
215	48/1////35.7/TONS
216	49/1/792/MBH
217	40/2/RAD
218	41/2/02/02/04/04/06/06
219	42/2////0.5
220	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
221	49/2/68/MBH
222	EQUIPMENT - 3
223	59/3/CARLISLE//VESTIBULE
224	60/1/1/BLKPLANT/1/1
225	62/1/EQ1121L/1/35.7/TONS/1.32/KW-TON
226	63/1/5/HP
227	65/1/1//1/2
228	67/1/EQ2101/1/5/HP/860/MBH
229	69/1/EQ4003////EQ4003
230	LOAD - 4
231	19/4/COMBINED ECOS
232	20/01/01/GND FLR CLG/3372/1/2/1.0//10.1

CONTENTS OF : E:\CB420.TM

LINE #	-----
233	20/02/02/GRN FLR HTG/2720/1/2/1.0//10.1
234	20/03/03/1ST FLR DORM/4598/1/2/1.33/1.6/11.5
235	20/04/04/1ST FLR HTG/1700/1/2/1.33/1.6/11.5
236	20/05/05/2ND FLR DORM/4598/1/2/1.83/1.6/11.5
237	20/06/06/2ND FLR HTG/1700/1/2/1.83/1.6/11.5
238	21/M////CBLQTX//CBLQTX
239	24/01/1/770/1//115/37
240	24/01/2/1005/1//115/127
241	24/01/3/565/1//115/217
242	24/02/1/350/1//115/127
243	24/02/2/210/1//115/217
244	24/03/1/896/1//115/37
245	24/03/2/1568/1//115/127
246	24/03/3/897/1//115/217
247	24/03/4/1128/1//115/307
248	24/04/1/196/1//115/127
249	24/04/2/552/1//115/307
250	24/05/1/896/1//115/37
251	24/05/2/1568/1//115/127
252	24/05/3/897/1//115/217
253	24/05/4/552/1//115/307
254	24/06/1/196/1//115/127
255	24/06/2/552/1//115/307
256	25/01/1/68/1/1/.55/.57
257	25/01/2/136/1/1/.55/.57/3
258	25/01/3/57/1/1/.55/.57
259	25/02/1/45/1/1/.55/.57/3
260	25/03/1/99/1/1/.55/.57
261	25/03/2/213/1/1/.55/.57/4
262	25/03/3/99/1/1/0.55/0.57
263	25/03/4/170/1/1/.55/.57
264	25/04/2/75/1/1/0.55/0.57/4
265	25/05/1/99/1/1/0.55/0.57
266	25/05/2/213/1/1/0.55/0.57
267	25/05/3/99/1/1/0.55/0.57
268	25/05/4/170/1/1/0.55/0.57
269	25/06/2/70/1/1/0.55/0.57
270	26/M/CBLQP/CBLQL/CBLQFAN//OFF/CBLQFAN/OFF/OFF/CBLQP/OFF
271	27/M/359/SF-PERS/230/190/.5/WATT-SF/INCAND
272	29/M/.091/CFM-SF/.091/CFM-SF/.19/CFM-SF/.19/CFM-SF
273	30/01/3900/CFM/3900/CFM/////1325/CFM
274	30/03/4500/CFM/4500/CFM/////1325/CFM
275	30/05/5000/CFM/5000/CFM/////1325/CFM
276	31/01/1/310/1//115/CONSTANT/65/45
277	31/02/1/1140/1//115/CONSTANT/65/45
278	31/05/1/4302/1//116/HRLYOADB
279	31/06/1/1700/1//116/HRLYOADB
280	33/3/4.5/.75/12.5
281	33/4/6.5/1.0/12.5
282	SYSTEM - 4
283	39/4/COMBINED ECOS
284	40/1/FC
285	41/1/01/01/03/03/05/05
286	42/1/0.5/0.5////0.5
287	45/1/CBLQCLG/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
288	48/1////35.7/TONS
289	49/1/792/MBH
290	40/2/RAD

CONTENTS OF : E:\CB420.TM

LINE #	-----
291	41/2/02/02/04/04/06/06
292	42/2////////0.5
293	45/2/OFF/OFF/OFF/OFF/OFF/CBLQHTG/OFF/OFF/OFF/OFF
294	49/2/68/MBH
295	EQUIPMENT - 4
296	59/4/CARLISLE///COMBINED ECOS
297	60/1/1/BLKPLANT/1/1
298	62/1/EQ1121L/1/35.7/TONS/1.32/KW-TON
299	63/1/5/HP
300	65/1/1//1/2
301	67/1/EQ2101/1/5/HP/860/MBH
302	69/1/EQ4003/////EQ4003

*Building 420*  
*Trace Output File*

933702

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**          T R A C E    6 0 0    A N A L Y S I S          **  
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**          by          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 420

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:25:39 2/ 2/94  
Dataset Name: CB420 .TM



AIRFLOW - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil.	Room
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Supply Airflow (Cfm)	Exhaust Airflow (Cfm)
1	FC	1,144	13,400	13,400	16,300	4,044	0	3,975
2	RAD	0	0	0	0	555	0	0
Totals		1,144	13,400	13,400	16,300	4,599	0	3,975

CAPACITY - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

		----- Cooling -----					----- Heating -----						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating	
System	System	Capacity	Capacity	Capacity	Totals	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Totals	
Number	Type	(Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	
	1 FC	35.7	0.0	0.0	35.7	-792,000	0	-9,952	0	0	0	-792,000	
	2 RAD	0.0	0.0	0.0	0.0	-68,000	0	0	0	0	0	-68,000	
Totals		35.7	0.0	0.0	35.7	-860,000	0	-9,952	0	0	0	-860,000	

The building peaked at hour 16 month 7 with a capacity of 23.7 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	----- Cooling -----				----- Heating -----		Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft/Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	
1	Main	FC	8.53	1.07	375.4	352.0	34.09	1.07	-63.02	12,568
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-11.11	6,120

System 1 Block FC - FAN COIL

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 89 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	41,966	0		41,966	14.73	*	44,290	23.32	*	0	0	0.00
Glass Cond	10,580	0		10,580	3.71	*	10,032	5.28	*	-51,264	-51,264	10.82
Wall Cond	58,394	9,639		68,033	23.87	*	62,113	32.71	*	-175,355	-204,291	43.12
Partition	1,407			1,407	0.49	*	1,723	0.91	*	-16,207	-16,207	3.42
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	91,799			91,799	32.21	*	44,818	23.60	*	-201,996	-201,996	42.64
Sub Total==>	204,146	9,639		213,785	75.02	*	162,977	85.82	*	-444,821	-473,757	100.00
Internal Loads						*			*			
Lights	17,587	0		17,587	6.17	*	17,801	9.37	*	0	0	0.00
People	13,013			13,013	4.57	*	6,683	3.52	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	30,599	0	0	30,599	10.74	*	24,484	12.89	*	0	0	0.00
Ceiling Load	2,463	-2,463		0	0.00	*	2,434	1.28	*	-6,449	0	0.00
Outside Air	0	0	0	35,859	12.58	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				4,764	1.67	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-44	0	-44	-0.02	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	237,209	7,131	0	284,963	100.00	*	189,895	100.00	*	-451,270	-473,757	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	35.7	428.4	13,400	77.0 65.5 78.3	61.8 55.2 56.1	12,568		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	4,612		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	35.7	428.4				10,742	1,423	13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling cfm	Heating cfm	Clg % OA	8.5	Type	Clg	Htg
Main Htg	-792.0	13,400	44.6	98.9	Vent	1,144	0	Clg Cfm/Sqft	1.07	SADB	62.0	98.9
Aux Htg	0.0	0	0.0	0.0	Infil	2,900	2,900	Clg Cfm/Ton	375.35	Plenum	75.6	66.3
Preheat	-10.0	13,400	61.0	61.7	Supply	13,400	13,400	Clg Sqft/Ton	352.04	Return	75.6	66.3
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	34.09	Ret/OA	76.9	66.3
Humidif	0.0	0	0.0	0.0	Return	12,325	13,400	No. People	35	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	455	0	Htg % OA	0.0	Fn MtrTD	0.1	0.1
Total	-792.0				Rm Exh	3,975	0	Htg Cfm/SqFt	1.07	Fn BldTD	0.1	0.1
					Auxil	0	0	Htg Btuh/SqFt	-63.02	Fn Frict	0.2	0.2

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,845	-6,845	7.23
Wall Cond	0	0		0	0.00	*	0	0.00	*	-35,411	-40,758	43.03
Partition	0			0	0.00	*	0	0.00	*	-8,463	-8,463	8.93
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-38,662	-38,662	40.81
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-89,380	-94,727	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,419	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-94,799	-94,727	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Part	2,840	
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0
Totals	0.0	0.0								Wall	2,056	190 9

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	--ENGINEERING CHECKS--			--TEMPERATURES (F)---		
								Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-68.0	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1	
Aux Htg	0.0	0	0.0	0.0	Infil	0	555	Clg Cfm/Ton	0.00	Plenum	0.0	64.8	
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	63.8	
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	63.8	
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0	
Total	-68.0				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0	
					Auxil	0	0	Htg Btuh/Sqft	-11.11	Fn Frict	0.0	0.0	

BUILDING U-VALUES - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	GND FLR CLG	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	84.8	18.03
Zone	1 Total/Ave.	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	84.8	18.03
3	1ST FLR DORM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	106.8	22.84
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	106.8	22.84
5	2ND FLR DORM	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	107.0	22.79
Zone	5 Total/Ave.	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	107.0	22.79
System	1 Total/Ave.	0.059	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.331	101.0	21.53
2	GRN FLR HTG	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	50.9	10.51
Zone	2 Total/Ave.	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	50.9	10.51
4	1ST FLR HTG	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	56.9	12.06
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	56.9	12.06
6	2ND FLR HTG	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	72.2	15.26
Zone	6 Total/Ave.	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	72.2	15.26
System	2 Total/Ave.	0.069	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.328	58.5	12.26
Building		0.063	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.330	87.1	18.50

BUILDING AREAS - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Sk1 /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GND FLR CLG	1	1	3,372	3,372	310	0	0	0	0	261	11	2,079
Zone	1 Total/Ave.				3,372	310	0	0	0	0	261	11	2,079
3	1ST FLR DORM	1	1	4,598	4,598	0	0	0	0	0	581	13	3,908
Zone	3 Total/Ave.				4,598	0	0	0	0	0	581	13	3,908
5	2ND FLR DORM	1	1	4,598	4,598	4,302	0	0	0	0	581	15	3,332
Zone	5 Total/Ave.				4,598	4,302	0	0	0	0	581	15	3,332
System	1 Total/Ave.				12,568	4,612	0	0	0	0	1,423	13	9,319
2	GRN FLR HTG	1	1	2,720	2,720	1,140	0	0	0	0	45	8	515
Zone	2 Total/Ave.				2,720	1,140	0	0	0	0	45	8	515
4	1ST FLR HTG	1	1	1,700	1,700	0	0	0	0	0	75	10	673
Zone	4 Total/Ave.				1,700	0	0	0	0	0	75	10	673
6	2ND FLR HTG	1	1	1,700	1,700	1,700	0	0	0	0	70	9	678
Zone	6 Total/Ave.				1,700	1,700	0	0	0	0	70	9	678
System	2 Total/Ave.				6,120	2,840	0	0	0	0	190	9	1,866
Building					18,688	7,452	0	0	0	0	1,613	13	11,185

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
BASE BUILDING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.000 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.370 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.370 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 0.00 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 14.17 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.8	18	266	-43,498	12	566	670.0	0	0	0.0	0	0
5 - 10	3.6	17	250	-86,995	10	473	1,340.0	0	0	0.0	0	0
10 - 15	5.4	15	231	-130,493	25	1,210	2,010.0	0	0	0.0	0	0
15 - 20	7.1	28	429	-173,990	23	1,128	2,680.0	42	3,650	0.0	0	0
20 - 25	8.9	9	141	-217,488	7	336	3,350.0	0	0	0.0	0	0
25 - 30	10.7	6	84	-260,986	7	359	4,020.0	0	0	0.0	0	0
30 - 35	12.5	5	75	-304,483	8	397	4,690.0	0	0	0.0	0	0
35 - 40	14.3	0	0	-347,981	2	87	5,360.0	0	0	0.0	0	0
40 - 45	16.1	0	0	-391,479	0	21	6,030.0	0	0	0.0	0	0
45 - 50	17.9	1	20	-434,976	1	57	6,700.0	21	1,825	0.0	0	0
50 - 55	19.6	1	11	-478,474	0	3	7,370.0	0	0	0.0	0	0
55 - 60	21.4	0	0	-521,972	1	71	8,040.0	0	0	0.0	0	0
60 - 65	23.2	0	0	-565,469	3	149	8,710.0	0	0	0.0	0	0
65 - 70	25.0	0	0	-608,967	1	28	9,380.0	0	0	0.0	0	0
70 - 75	26.8	0	0	-652,464	0	0	10,050.0	0	0	0.0	0	0
75 - 80	28.6	0	0	-695,962	0	0	10,720.0	0	0	0.0	0	0
80 - 85	30.3	0	0	-739,460	0	0	11,390.0	0	0	0.0	0	0
85 - 90	32.1	0	0	-782,957	0	0	12,060.0	0	0	0.0	0	0
90 - 95	33.9	0	0	-826,455	0	0	12,730.0	0	0	0.0	0	0
95 - 100	35.7	0	0	-869,953	0	0	13,400.0	38	3,285	0.0	0	0
Hours Off	0.0	0	7,253	0	0	3,875	0.0	0	0	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	Zone Number					
	1	3	5	2	4	6
Max. Temp.	78.9	79.2	79.3	90.3	94.8	91.0
Mo./Hr.	7 14	7 14	7 14	8 24	8 23	8 24
Day Type	1	1	1	1	1	1

	Number of Hours					
Above 100	0	0	0	0	0	0
95 - 100	0	0	0	0	0	0
90 - 95	0	0	0	133	1,360	172
85 - 90	0	0	0	2,051	1,362	1,400
80 - 85	0	0	0	863	214	1,200
75 - 80	2,958	2,949	3,140	774	718	558
70 - 75	799	757	617	643	426	512
65 - 70	4,947	4,908	4,916	4,296	4,680	4,918
60 - 65	56	146	87	0	0	0
55 - 60	0	0	0	0	0	0
50 - 55	0	0	0	0	0	0
Below 50	0	0	0	0	0	0

Min. Temp.	64.6	64.0	64.4	67.9	67.9	67.9
Mo./Hr.	2 15	2 15	2 15	3 2	3 2	4 3
Day Type	2	2	2	2	1	2

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	STEAM On Peak (Thrm)	STEAM DMND On Peak (Thrm/hr)
Jan	7,849	18	1,872	6
Feb	7,093	18	1,813	6
March	7,915	18	1,200	5
April	7,426	18	498	1
May	4,155	13	0	0
June	7,675	35	0	0
July	13,127	55	0	0
Aug	7,941	42	0	0
Sept	3,978	29	0	0
Oct	6,561	18	236	1
Nov	7,585	18	842	2
Dec	7,817	18	1,595	5
Total	89,120	55	8,056	6

Building Energy Consumption = 59,386 (Btu/Sq Ft/Year)  
Source Energy Consumption = 106,313 (Btu/Sq Ft/Year)

Floor Area = 18,688 (Sq Ft)



## ----- EQUIPMENT ENERGY CONSUMPTION -----

Ref	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS ELEC PK	2472 9.3	2234 9.3	2534 9.3	2383 9.3	2503 9.3	2444 9.3	2442 9.3	2534 9.3	2383 9.3	2503 9.3	2383 9.3	2442 9.3	29,257 9.3
1	MISC LD ELEC PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
2	MISC LD GAS PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
3	MISC LD OIL PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
4	MISC LD P STEAM PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
5	MISC LD P HOTW20 PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
6	MISC LD P CHILL PK	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0
1	EQ1121L ELEC PK	AIR-CLD RECIP 35-60 TONS												
		0	0	0	0	0	1584	4636	1602	0	0	0	0	7,822
		0.0	0.0	0.0	0.0	0.0	21.4	37.7	29.0	9.4	0.0	0.0	0.0	37.7
1	EQ5200 ELEC PK	CONDENSER FANS												
		0	0	0	0	0	193	539	194	0	0	0	0	926
		0.0	0.0	0.0	0.0	0.0	2.3	3.9	3.1	1.1	0.0	0.0	0.0	3.9
1	EQ5001 ELEC PK	CHILLED WATER PUMP C.V.												
		0	0	0	0	0	1750	3644	1849	0	0	0	0	7,243
		0.0	0.0	0.0	0.0	0.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	5.0
1	EQ5313 ELEC PK	CONTROLS												
		0	0	0	0	0	106	220	112	0	0	0	0	437
		0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4003 ELEC PK	FC CENTRIF. FAN C.V.												
		1200	1084	1200	1161	1200	1161	1200	1200	1161	1200	1161	1200	14,130
		2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
1	EQ4003	FC CENTRIF. FAN C.V.												

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
BASE BUILDING

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility   ELECTRIC DEMAND

Peak Value        55.0    (kW)  
Yearly Time of Peak 16 (hr)   7 (mo)

Hour 16   Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1121L	AIR-CLD RECIP 35-60 TONS	41.9	76.25
Sub Total			41.9	76.25
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	3.7	6.76
Sub Total			3.7	6.76
Sub Total			0.0	0.00

Miscellaneous

	Lights		9.3	16.99
	Base Utilities		0.0	0.00
	Misc Equipment		0.0	0.00
Sub Total			9.3	16.99

Grand Total			55.0	100.00
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**          T R A C E   6 0 0   A N A L Y S I S          **  
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**          by                **  
**                                     **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 420

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0832 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:33:49 2/ 2/94  
Dataset Name: CB420 .TM

AIRFLOW - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	FC	1,144	13,400	13,400	15,548	3,292	0	3,975
2	RAD	0	0	0	0	411	0	0
Totals		1,144	13,400	13,400	15,548	3,703	0	3,975

CAPACITY - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	FC	35.7	0.0	0.0	35.7	-792,000	0	-58,096	0	0	0	-792,000
2	RAD	0.0	0.0	0.0	0.0	-68,000	0	0	0	0	0	-68,000
Totals		35.7	0.0	0.0	35.7	-860,000	0	-58,096	0	0	0	-860,000

The building peaked at hour 16 month 7 with a capacity of 15.1 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	FC	8.53	1.07	375.4	352.0	34.09	1.07	-63.02	12,568
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-11.11	6,120

System 1 Block FC - FAN COIL

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WS/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	41,966	0		41,966	23.23	*	43,128	35.12	*	0	0	0.00
Glass Cond	10,580	0		10,580	5.86	*	10,356	8.43	*	-51,264	-51,264	21.08
Wall Cond	8,988	1,518		10,506	5.82	*	9,130	7.43	*	-29,565	-34,557	14.21
Partition	346			346	0.19	*	483	0.39	*	-7,722	-7,722	3.18
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	53,618			53,618	29.68	*	35,131	28.60	*	-149,627	-149,627	61.53
Sub Total==>	115,497	1,518		117,015	64.78	*	98,227	79.98	*	-238,177	-243,169	100.00
Internal Loads						*			*			
Lights	17,744	0		17,744	9.82	*	17,744	14.45	*	0	0	0.00
People	13,013			13,013	7.20	*	6,479	5.28	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	30,756	0	0	30,756	17.03	*	24,223	19.72	*	0	0	0.00
Ceiling Load	409	-409		0	0.00	*	364	0.30	*	-1,110	0	0.00
Outside Air	0	0	0	28,105	15.56	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				4,764	2.64	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	146,662	1,109	0	180,640	100.00	*	122,814	100.00	*	-239,287	-243,169	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WS/HR			Leaving DB/WS/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	12,568	
Main Clg	35.7	428.4	350.5	76.6	67.2	87.6	66.4	57.3	57.5	Part	4,612	
Aux Clg	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0 0
Totals	35.7	428.4								Wall	10,742	1,423 13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F
Main Htg	-792.0	13,400	30.1	84.4
Aux Htg	0.0	0	0.0	0.0
Preheat	-58.1	13,400	62.3	66.3
Reheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-792.0			

-----AIRFLOWS (cfm)-----

	Type	Cooling	Heating
Vent		1,144	0
Infil		2,148	2,148
Supply		13,400	13,400
Mincfm		0	0
Return		11,573	13,400
Exhaust		0	0
Rm Exh		3,975	0
Auxil		0	0

-----ENGINEERING CHECKS-----

Clg % OA	8.5
Clg Cfm/Sqft	1.07
Clg Cfm/Ton	375.35
Clg Sqft/Ton	352.04
Clg Btuh/Sqft	34.09
No. People	35
Htg % OA	0.0
Htg Cfm/Sqft	1.07
Htg Btuh/Sqft	-63.02

-----TEMPERATURES (F)-----

Type	Clg	Htg
SADB	66.6	84.4
Plenum	75.1	67.7
Return	75.1	67.7
Ret/OA	76.4	67.7
Runarnd	75.0	68.0
Fn MtrTD	0.1	0.1
Fn BldTD	0.1	0.1
Fn Frict	0.2	0.2

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WS/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,845	-6,845	14.62
Wall Cond	0	0		0	0.00	*	0	0.00	*	-5,970	-6,915	14.77
Partition	0			0	0.00	*	0	0.00	*	-4,408	-4,408	9.42
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-28,638	-28,638	61.18
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-45,862	-46,806	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-947	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-46,809	-46,806	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WS/HR Deg F Deg F Grains	Leaving DB/WS/HR Deg F Deg F Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Floor	6,120	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	2,840	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	0.0	0.0				Roof	0	0 0
						Wall	2,056	190 9

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % DA	0.0	Type	Clg	Htg
Main Htg	-68.0	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	411	Clg Cfm/Ton	0.00	Plenum	0.0	67.4
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	67.2
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/DA	0.0	67.2
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % DA	0.0	Fn MtrTD	0.0	0.0
Total	-68.0				Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-11.11	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Windo	Wall	Ceil.		
1	GND FLR CLG	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	93.0	19.82
Zone	1 Total/Ave.	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	93.0	19.82
3	1ST FLR DORM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	108.9	23.25
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	108.9	23.25
5	2ND FLR DORM	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	109.7	23.33
Zone	5 Total/Ave.	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	109.7	23.33
System	1 Total/Ave.	0.029	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.331	104.9	22.36
2	GRN FLR HTG	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	81.7	17.40
Zone	2 Total/Ave.	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	81.7	17.40
4	1ST FLR HTG	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	57.8	12.25
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	57.8	12.25
6	2ND FLR HTG	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	74.1	15.65
Zone	6 Total/Ave.	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	74.1	15.65
System	2 Total/Ave.	0.039	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.328	73.0	15.49
Building		0.033	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.330	94.5	20.11



BUILDING AREAS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GND FLR CLG	1	1	3,372	3,372	310	0	0	0	0	261	11	2,079
Zone	1 Total/Ave.				3,372	310	0	0	0	0	261	11	2,079
3	1ST FLR DORM	1	1	4,598	4,598	0	0	0	0	0	581	13	3,908
Zone	3 Total/Ave.				4,598	0	0	0	0	0	581	13	3,908
5	2ND FLR DORM	1	1	4,598	4,598	4,302	0	0	0	0	581	15	3,332
Zone	5 Total/Ave.				4,598	4,302	0	0	0	0	581	15	3,332
System	1 Total/Ave.				12,568	4,612	0	0	0	0	1,423	13	9,319
2	GRN FLR HTG	1	1	2,720	2,720	1,140	0	0	0	0	45	8	515
Zone	2 Total/Ave.				2,720	1,140	0	0	0	0	45	8	515
4	1ST FLR HTG	1	1	1,700	1,700	0	0	0	0	0	75	10	673
Zone	4 Total/Ave.				1,700	0	0	0	0	0	75	10	673
6	2ND FLR HTG	1	1	1,700	1,700	1,700	0	0	0	0	70	9	678
Zone	6 Total/Ave.				1,700	1,700	0	0	0	0	70	9	678
System	2 Total/Ave.				6,120	2,840	0	0	0	0	190	9	1,866
Building					18,688	7,452	0	0	0	0	1,613	13	11,185

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.000 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.120 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.120 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 0.00 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 10.93 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.8	37	533	-45,905	19	803	670.0	0	0	0.0	0	0
5 - 10	3.6	17	250	-91,810	50	2,153	1,340.0	0	0	0.0	0	0
10 - 15	5.4	23	340	-137,714	14	604	2,010.0	0	0	0.0	0	0
15 - 20	7.1	17	241	-183,619	11	481	2,680.0	42	3,650	0.0	0	0
20 - 25	8.9	4	60	-229,524	2	81	3,350.0	0	0	0.0	0	0
25 - 30	10.7	0	0	-275,429	2	87	4,020.0	0	0	0.0	0	0
30 - 35	12.5	0	0	-321,334	3	118	4,690.0	0	0	0.0	0	0
35 - 40	14.3	1	20	-367,238	0	0	5,360.0	0	0	0.0	0	0
40 - 45	16.1	1	11	-413,143	0	0	6,030.0	0	0	0.0	0	0
45 - 50	17.9	0	0	-459,048	0	0	6,700.0	21	1,825	0.0	0	0
50 - 55	19.6	0	0	-504,953	0	0	7,370.0	0	0	0.0	0	0
55 - 60	21.4	0	0	-550,858	0	0	8,040.0	0	0	0.0	0	0
60 - 65	23.2	0	0	-596,762	0	0	8,710.0	0	0	0.0	0	0
65 - 70	25.0	0	0	-642,667	0	0	9,380.0	0	0	0.0	0	0
70 - 75	26.8	0	0	-688,572	0	0	10,050.0	0	0	0.0	0	0
75 - 80	28.6	0	0	-734,477	0	0	10,720.0	0	0	0.0	0	0
80 - 85	30.3	0	0	-780,382	0	0	11,390.0	0	0	0.0	0	0
85 - 90	32.1	0	0	-826,286	0	0	12,060.0	0	0	0.0	0	0
90 - 95	33.9	0	0	-872,191	0	0	12,730.0	0	0	0.0	0	0
95 - 100	35.7	0	0	-918,096	0	0	13,400.0	38	3,285	0.0	0	0
Hours Off	0.0	0	7,305	0	0	4,433	0.0	0	0	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
 WALL & ROOF INSULATION

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature Range (F)	----- Zone Number -----					
	1	3	5	2	4	6

Max. Temp.	78.4	78.7	78.9	90.9	102.4	95.6
Mo./Hr.	7 14	7 14	7 14	9 20	9 20	8 21
Day Type	1	1	1	5	1	2

	..... Number of Hours .....					
Above 100	0	0	0	0	1,464	0
95 - 100	0	0	0	0	489	621
90 - 95	0	0	0	720	461	1,587
85 - 90	0	0	0	1,644	704	250
80 - 85	0	0	0	1,226	459	922
75 - 80	2,928	2,940	3,019	1,137	399	438
70 - 75	1,216	1,144	1,105	1,153	833	598
65 - 70	4,616	4,676	4,636	2,880	3,951	4,344
60 - 65	0	0	0	0	0	0
55 - 60	0	0	0	0	0	0
50 - 55	0	0	0	0	0	0
Below 50	0	0	0	0	0	0

Min. Temp.	66.5	66.1	66.4	67.9	67.9	67.9
Mo./Hr.	2 15	2 15	2 15	3 6	3 22	3 3
Day Type	2	2	2	3	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	STEAM	STEAM DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	7,848	18	927	3
Feb	7,090	18	925	3
March	7,912	18	580	2
April	6,391	18	193	1
May	4,152	13	0	0
June	6,894	28	0	0
July	10,456	42	0	0
Aug	7,278	34	0	0
Sept	3,976	28	0	0
Oct	4,624	18	30	1
Nov	7,483	18	355	1
Dec	7,815	18	753	3
Total	81,920	42	3,762	3

Building Energy Consumption = 35,093 (Btu/Sq Ft/Year)  
Source Energy Consumption = 71,730 (Btu/Sq Ft/Year)

Floor Area = 18,688 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	2472	2234	2534	2383	2503	2444	2442	2534	2383	2503	2383	2442	29,257
	PK	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1121L	AIR-CLD RECIP 35-60 TONS												
	ELEC	0	0	0	0	0	1113	2634	1156	0	0	0	0	4,903
	PK	0.0	0.0	0.0	0.0	0.0	9.4	25.4	19.0	9.1	0.0	0.0	0.0	25.4
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	0	138	314	143	0	0	0	0	595
	PK	0.0	0.0	0.0	0.0	0.0	0.8	2.6	2.1	0.9	0.0	0.0	0.0	2.6
1	EQ5001	CHILLED WATER PUMP C.V.												
	ELEC	0	0	0	0	0	1511	3226	1695	0	0	0	0	6,433
	PK	0.0	0.0	0.0	0.0	0.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	5.0
1	EQ5313	CONTROLS												
	ELEC	0	0	0	0	0	91	195	102	0	0	0	0	388
	PK	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4003	FC CENTRIF. FAN C.V.												
	ELEC	1200	1084	1200	1161	1200	1161	1200	1200	1161	1200	1161	1200	14,130
	PK	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
1	EQ4003	FC CENTRIF. FAN C.V.												

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 42.4 (kW)

Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1121L	AIR-CLD RECIP 35-60 TONS	29.3	69.17
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Sub Total			29.3	69.17
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	3.7	8.78
---	--	------------------------------------	-----	------

Sub Total			3.7	8.78
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Sub Total			0.0	0.00
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Miscellaneous

Lights			9.3	22.06
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Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			9.3	22.06
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Grand Total			42.4	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 420

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:42:53 2/ 2/94  
Dataset Name: CB420 .TM



AIRFLOW - ALTERNATIVE 3  
VESTIBULE

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	FC	1,144	13,400	13,400	16,193	3,937	0	3,975
2	RAD	0	0	0	0	535	0	0
Totals		1,144	13,400	13,400	16,193	4,471	0	3,975

CAPACITY - ALTERNATIVE 3  
VESTIBULE

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	FC	35.7	0.0	0.0	35.7	-792,000	0	-11,597	0	0	0	-792,000
2	RAD	0.0	0.0	0.0	0.0	-68,000	0	0	0	0	0	-68,000
Totals		35.7	0.0	0.0	35.7	-860,000	0	-11,597	0	0	0	-860,000

The building peaked at hour 16 month 7 with a capacity of 23.4 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
VESTIBULE

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	FC	8.53	1.07	375.4	352.0	34.09	1.07	-63.02	12,568
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-11.11	6,120

System 1 Block FC - FAN COIL

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 89 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	41,966	0		41,966	14.92	*	44,290	23.53	*	0	0	0.00
Glass Cond	10,580	0		10,580	3.76	*	10,032	5.33	*	-51,264	-51,264	10.99
Wall Cond	58,394	9,637		68,031	24.19	*	62,113	32.99	*	-175,355	-204,291	43.81
Partition	1,407			1,407	0.50	*	1,723	0.92	*	-16,207	-16,207	3.48
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	88,164			88,164	31.34	*	43,158	22.93	*	-194,515	-194,515	41.72
Sub Total==>	200,511	9,637		210,148	74.71	*	161,317	85.69	*	-437,340	-466,276	100.00
Internal Loads												
Lights	17,587	0		17,587	6.25	*	17,801	9.46	*	0	0	0.00
People	13,013			13,013	4.63	*	6,683	3.55	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	30,599	0	0	30,599	10.88	*	24,484	13.01	*	0	0	0.00
Ceiling Load	2,480	-2,480		0	0.00	*	2,450	1.30	*	-6,449	0	0.00
Outside Air	0	0	0	35,763	12.71	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				4,764	1.69	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	233,591	7,157	0	281,275	100.00	*	188,251	100.00	*	-443,789	-466,276	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	35.7	428.4	13,400	77.0	65.5	78.4	61.9	55.2	56.0	Part	4,612	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	0	0 0
Totals	35.7	428.4								Wall	10,742	1,423 13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	--ENGINEERING CHECKS--			--TEMPERATURES (F)---		
								Clg % OA	8.5	Type	Clg	Htg	
Main Htg	-792.0	13,400	44.1	98.4	Vent	1,144	0	Clg Cfm/Sqft	1.07	SADB	62.1	98.4	
Aux Htg	0.0	0	0.0	0.0	Infil	2,793	2,793	Clg Cfm/Ton	375.35	Plenum	75.6	66.3	
Preheat	-11.6	13,400	61.0	61.8	Supply	13,400	13,400	Clg Sqft/Ton	352.04	Return	75.6	66.3	
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	34.09	Ret/OA	76.9	66.3	
Humidif	0.0	0	0.0	0.0	Return	12,218	13,400	No. People	35	Runarnd	75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Exhaust	371	0	Htg % OA	0.0	Fn MtrTD	0.1	0.1	
Total	-792.0				Rm Exh	3,975	0	Htg Cfm/SqFt	1.07	Fn BldTD	0.1	0.1	
					Auxil	0	0	Htg Btuh/SqFt	-63.02	Fn Frict	0.2	0.2	

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,845	-6,845	7.34
Wall Cond	0	0		0	0.00	*	0	0.00	*	-35,411	-40,758	43.69
Partition	0			0	0.00	*	0	0.00	*	-8,463	-8,463	9.07
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-37,230	-37,230	39.91
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-87,948	-93,295	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,419	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-93,367	-93,295	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Floor	6,120	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	2,840	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	0.0	0.0				Roof	0	0 0
						Wall	2,056	190 9

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-68.0	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	535	Clg Cfm/Ton	0.00	Plenum	0.0	64.8
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	63.8
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	63.8
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-68.0				Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-11.11	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 3  
VESTIBULE

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	GND FLR CLG	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	84.8	18.03
Zone	1 Total/Ave.	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	84.8	18.03
3	1ST FLR DORM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	106.8	22.84
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	106.8	22.84
5	2ND FLR DORM	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	107.0	22.79
Zone	5 Total/Ave.	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	107.0	22.79
System	1 Total/Ave.	0.059	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.331	101.0	21.53
2	GRN FLR HTG	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	50.9	10.51
Zone	2 Total/Ave.	0.088	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.317	50.9	10.51
4	1ST FLR HTG	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	56.9	12.06
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	56.9	12.06
6	2ND FLR HTG	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	72.2	15.26
Zone	6 Total/Ave.	0.057	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.337	72.2	15.26
System	2 Total/Ave.	0.069	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.328	58.5	12.26
Building		0.063	0.000	0.000	0.000	0.000	0.550	0.563	0.344	0.330	87.1	18.50

BUILDING AREAS - ALTERNATIVE 3  
VESTIBULE

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	GND FLR CLG	1	1	3,372	3,372	310	0	0	0	0	261	11	2,079
Zone	1 Total/Ave.				3,372	310	0	0	0	0	261	11	2,079
3	1ST FLR DORM	1	1	4,598	4,598	0	0	0	0	0	581	13	3,908
Zone	3 Total/Ave.				4,598	0	0	0	0	0	581	13	3,908
5	2ND FLR DORM	1	1	4,598	4,598	4,302	0	0	0	0	581	15	3,332
Zone	5 Total/Ave.				4,598	4,302	0	0	0	0	581	15	3,332
System	1 Total/Ave.				12,568	4,612	0	0	0	0	1,423	13	9,319
2	GRN FLR HTG	1	1	2,720	2,720	1,140	0	0	0	0	45	8	515
Zone	2 Total/Ave.				2,720	1,140	0	0	0	0	45	8	515
4	1ST FLR HTG	1	1	1,700	1,700	0	0	0	0	0	75	10	673
Zone	4 Total/Ave.				1,700	0	0	0	0	0	75	10	673
6	2ND FLR HTG	1	1	1,700	1,700	1,700	0	0	0	0	70	9	678
Zone	6 Total/Ave.				1,700	1,700	0	0	0	0	70	9	678
System	2 Total/Ave.				6,120	2,840	0	0	0	0	190	9	1,866
Building					18,688	7,452	0	0	0	0	1,613	13	11,185

ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
VESTIBULE

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.000 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.370 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.370 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 0.00 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 14.17 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
VESTIBULE

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.8	16	246	-43,580	12	563	670.0	0	0	0.0	0	0
5 - 10	3.6	18	270	-87,160	10	497	1,340.0	0	0	0.0	0	0
10 - 15	5.4	15	231	-130,739	25	1,225	2,010.0	0	0	0.0	0	0
15 - 20	7.1	28	418	-174,319	22	1,090	2,680.0	42	3,650	0.0	0	0
20 - 25	8.9	10	152	-217,899	6	305	3,350.0	0	0	0.0	0	0
25 - 30	10.7	6	84	-261,479	7	359	4,020.0	0	0	0.0	0	0
30 - 35	12.5	5	75	-305,059	8	397	4,690.0	0	0	0.0	0	0
35 - 40	14.3	0	0	-348,639	2	87	5,360.0	0	0	0.0	0	0
40 - 45	16.1	0	0	-392,218	0	21	6,030.0	0	0	0.0	0	0
45 - 50	17.9	1	20	-435,798	1	57	6,700.0	21	1,825	0.0	0	0
50 - 55	19.6	1	11	-479,378	0	3	7,370.0	0	0	0.0	0	0
55 - 60	21.4	0	0	-522,958	1	71	8,040.0	0	0	0.0	0	0
60 - 65	23.2	0	0	-566,538	3	149	8,710.0	0	0	0.0	0	0
65 - 70	25.0	0	0	-610,118	1	28	9,380.0	0	0	0.0	0	0
70 - 75	26.8	0	0	-653,698	0	0	10,050.0	0	0	0.0	0	0
75 - 80	28.6	0	0	-697,277	0	0	10,720.0	0	0	0.0	0	0
80 - 85	30.3	0	0	-740,857	0	0	11,390.0	0	0	0.0	0	0
85 - 90	32.1	0	0	-784,437	0	0	12,060.0	0	0	0.0	0	0
90 - 95	33.9	0	0	-828,017	0	0	12,730.0	0	0	0.0	0	0
95 - 100	35.7	0	0	-871,597	0	0	13,400.0	38	3,285	0.0	0	0
Hours Off	0.0	0	7,253	0	0	3,908	0.0	0	0	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
 VESTIBULE

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	Zone Number					
	1	3	5	2	4	6

Max. Temp.	78.9	79.2	79.3	90.3	94.8	91.0
Mo./Hr.	7 14	7 14	7 14	8 24	8 23	8 24
Day Type	1	1	1	1	1	1

	Number of Hours					
Above 100	0	0	0	0	0	0
95 - 100	0	0	0	0	0	0
90 - 95	0	0	0	133	1,360	172
85 - 90	0	0	0	2,051	1,362	1,400
80 - 85	0	0	0	863	214	1,200
75 - 80	2,983	2,990	3,167	797	735	558
70 - 75	774	716	590	636	413	512
65 - 70	4,947	4,908	4,916	4,280	4,676	4,918
60 - 65	56	146	87	0	0	0
55 - 60	0	0	0	0	0	0
50 - 55	0	0	0	0	0	0
Below 50	0	0	0	0	0	0

Min. Temp.	64.6	64.1	64.5	67.9	67.9	67.9
Mo./Hr.	2 15	2 15	2 15	3 2	4 4	2 7
Day Type	2	2	2	2	2	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
VESTIBULE

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	STEAM	STEAM DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	7,849	18	1,845	6
Feb	7,092	18	1,784	6
March	7,914	18	1,178	5
April	7,425	18	483	1
May	4,155	13	0	0
June	7,747	35	0	0
July	13,117	55	0	0
Aug	7,968	41	0	0
Sept	3,978	29	0	0
Oct	6,475	18	223	1
Nov	7,585	18	829	2
Dec	7,816	18	1,573	5
Total	89,122	55	7,914	6

Building Energy Consumption = 58,624 (Btu/Sq Ft/Year)  
Source Energy Consumption = 105,297 (Btu/Sq Ft/Year)

Floor Area = 18,688 (Sq Ft)



## ----- EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total	
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec		
0	LIGHTS														
	ELEC	2472	2234	2534	2383	2503	2444	2442	2534	2383	2503	2383	2442	29,257	
	PK	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	
1	MISC LD														
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	MISC LD														
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	MISC LD														
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	MISC LD														
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5	MISC LD														
	P HOTW20	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
6	MISC LD														
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	EQ1121L		AIR-CLD RECIP 35-60 TONS												
	ELEC	0	0	0	0	0	1612	4627	1626	0	0	0	0	7,865	
	PK	0.0	0.0	0.0	0.0	0.0	22.0	37.3	28.6	9.3	0.0	0.0	0.0	37.3	
1	EQ5200		CONDENSER FANS												
	ELEC	0	0	0	0	0	196	538	197	0	0	0	0	931	
	PK	0.0	0.0	0.0	0.0	0.0	2.4	3.8	3.0	1.1	0.0	0.0	0.0	3.8	
1	EQ5001		CHILLED WATER PUMP C.V.												
	ELEC	0	0	0	0	0	1790	3644	1849	0	0	0	0	7,283	
	PK	0.0	0.0	0.0	0.0	0.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	5.0	
1	EQ5313		CONTROLS												
	ELEC	0	0	0	0	0	108	220	112	0	0	0	0	439	
	PK	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3	
1	EQ4003		FC CENTRIF. FAN C.V.												
	ELEC	1200	1084	1200	1161	1200	1161	1200	1200	1161	1200	1161	1200	14,130	
	PK	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	
1	EQ4003		FC CENTRIF. FAN C.V.												

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UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
VESTIBULE

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        54.6    (kW)  
Yearly Time of Peak 16 (hr)    7 (mo)

Hour 16    Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1121L	AIR-CLD RECIP 35-60 TONS	41.6	76.09
Sub Total			41.6	76.09
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	3.7	6.81
Sub Total			3.7	6.81
Sub Total			0.0	0.00

Miscellaneous

	Lights		9.3	17.11
	Base Utilities		0.0	0.00
	Misc Equipment		0.0	0.00
Sub Total			9.3	17.11
Grand Total			54.6	100.00

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*****  
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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**          by          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 420

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:51:31 2/ 2/94  
Dataset Name: CB420 .TM

AIRFLOW - ALTERNATIVE 4  
COMBINED ECOS

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil. Supply	Room Exhaust
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Airflow (Cfm)	Airflow (Cfm)
1	FC	1,144	13,400	13,400	15,441	3,185	0	3,975
2	RAD	0	0	0	0	391	0	0
Totals		1,144	13,400	13,400	15,441	3,575	0	3,975

CAPACITY - ALTERNATIVE 4  
COMBINED ECOS

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	----- Cooling -----					----- Heating -----					
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	FC	35.7	0.0	0.0	35.7	-792,000	0	-59,823	0	0	0	-792,000
2	RAD	0.0	0.0	0.0	0.0	-68,000	0	0	0	0	0	-68,000
Totals		35.7	0.0	0.0	35.7	-860,000	0	-59,823	0	0	0	-860,000

The building peaked at hour 16 month 7 with a capacity of 14.9 tons

ENGINEERING CHECKS - ALTERNATIVE 4  
COMBINED ECOS

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	----- Cooling -----				--- Heating ---		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	FC	8.53	1.07	375.4	352.0	34.09	1.07	-63.02	12,568
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-11.11	6,120

System 1 Block FC - FAN COIL

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)		Space Sensible (Btuh)	Percent Of Tot (%)		Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	41,966	0		41,966	23.44	*	44,290	36.58	*	0	0	0.00
Glass Cond	10,580	0		10,580	5.91	*	10,133	8.37	*	-51,264	-51,264	21.75
Wall Cond	8,988	1,518		10,505	5.87	*	9,288	7.67	*	-29,565	-34,557	14.66
Partition	346			346	0.19	*	483	0.40	*	-7,722	-7,722	3.28
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	51,661			51,661	28.86	*	32,167	26.57	*	-142,145	-142,145	60.31
Sub Total==>	113,541	1,518		115,058	64.27	*	96,360	79.58	*	-230,696	-235,688	100.00
Internal Loads												
Lights	17,744	0		17,744	9.91	*	17,744	14.65	*	0	0	0.00
People	13,013			13,013	7.27	*	6,597	5.45	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	30,756	0	0	30,756	17.18	*	24,340	20.10	*	0	0	0.00
Ceiling Load	412	-412		0	0.00	*	386	0.32	*	-1,110	0	0.00
Outside Air	0	0	0	28,438	15.89	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				4,764	2.66	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat PkUp		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	144,709	1,106	0	179,017	100.00	*	121,086	100.00	*	-231,806	-235,688	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	35.7	428.4	13,400	76.6 67.1 87.1	66.5 57.2 56.9	12,568		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	4,612		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	35.7	428.4				10,742	1,423	13

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling Cooling	Heating Heating	Clg % OA	8.5	Type	Clg	Htg
Main Htg	-792.0	13,400	29.6	83.9	Vent	1,144	0	Clg Cfm/Sqft	1.07	SADB	66.7	83.9
Aux Htg	0.0	0	0.0	0.0	Infil	2,041	2,041	Clg Cfm/Ton	375.35	Plenum	75.1	67.7
Preheat	-59.8	13,400	62.3	66.4	Supply	13,400	13,400	Clg Sqft/Ton	352.04	Return	75.1	67.7
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	34.09	Ret/OA	76.4	67.7
Humidif	0.0	0	0.0	0.0	Return	11,466	13,400	No. People	35	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.1	0.1
Total	-792.0				Rm Exh	3,975	0	Htg Cfm/Sqft	1.07	Fn BldTD	0.1	0.1
					Auxil	0	0	Htg Btuh/Sqft	-63.02	Fn Frict	0.2	0.2

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-6,845	-6,845	15.09
Wall Cond	0	0		0	0.00	*	0	0.00	*	-5,970	-6,915	15.24
Partition	0			0	0.00	*	0	0.00	*	-4,408	-4,408	9.72
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-27,206	-27,206	59.96
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-44,430	-45,374	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-947	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-45,377	-45,374	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Floor	6,120	
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Part	2,840	
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	0.0	0.0				Roof	0	0 0
						Wall	2,056	190 9

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-68.0	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	391	Clg Cfm/Ton	0.00	Plenum	0.0	67.4
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	67.2
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	67.2
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-68.0				Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-11.11	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 4  
COMBINED ECOS

----- B U I L D I N G U - V A L U E S -----

		Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
Room Number	Description	Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	GND FLR CLG	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	93.0	19.82
Zone	1 Total/Ave.	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	93.0	19.82
3	1ST FLR DORM	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	108.9	23.25
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	108.9	23.25
5	2ND FLR DORM	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	109.7	23.33
Zone	5 Total/Ave.	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	109.7	23.33
System	1 Total/Ave.	0.029	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.331	104.9	22.36
2	GRN FLR HTG	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	81.7	17.40
Zone	2 Total/Ave.	0.058	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.317	81.7	17.40
4	1ST FLR HTG	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	57.8	12.25
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	57.8	12.25
6	2ND FLR HTG	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	74.1	15.65
Zone	6 Total/Ave.	0.027	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.337	74.1	15.65
System	2 Total/Ave.	0.039	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.328	73.0	15.49
Building		0.033	0.000	0.000	0.000	0.000	0.550	0.563	0.058	0.330	94.5	20.11



BUILDING AREAS - ALTERNATIVE 4  
COMBINED ECOS

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Sk1 /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /W1 (%)	Net Wall Area (sqft)
1	GND FLR CLG	1	1	3,372	3,372	310	0	0	0	0	261	11	2,079
Zone	1 Total/Ave.				3,372	310	0	0	0	0	261	11	2,079
3	1ST FLR DORM	1	1	4,598	4,598	0	0	0	0	0	581	13	3,908
Zone	3 Total/Ave.				4,598	0	0	0	0	0	581	13	3,908
5	2ND FLR DORM	1	1	4,598	4,598	4,302	0	0	0	0	581	15	3,332
Zone	5 Total/Ave.				4,598	4,302	0	0	0	0	581	15	3,332
System	1 Total/Ave.				12,568	4,612	0	0	0	0	1,423	13	9,319
2	GRN FLR HTG	1	1	2,720	2,720	1,140	0	0	0	0	45	8	515
Zone	2 Total/Ave.				2,720	1,140	0	0	0	0	45	8	515
4	1ST FLR HTG	1	1	1,700	1,700	0	0	0	0	0	75	10	672
Zone	4 Total/Ave.				1,700	0	0	0	0	0	75	10	672
6	2ND FLR HTG	1	1	1,700	1,700	1,700	0	0	0	0	70	9	678
Zone	6 Total/Ave.				1,700	1,700	0	0	0	0	70	9	678
System	2 Total/Ave.				6,120	2,840	0	0	0	0	190	9	1,866
Building					18,688	7,452	0	0	0	0	1,613	13	11,185

ASHRAE 90 ANALYSIS - ALTERNATIVE 4  
COMBINED ECOS

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.000 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.120 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.120 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTvr) = 0.00 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTvw) = 10.93 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4  
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	1.8	39	578	-45,991	20	869	670.0	0	0	0.0	0	0
5 - 10	3.6	16	242	-91,982	48	2,078	1,340.0	0	0	0.0	0	0
10 - 15	5.4	23	348	-137,974	15	663	2,010.0	0	0	0.0	0	0
15 - 20	7.1	16	241	-183,965	9	407	2,680.0	42	3,650	0.0	0	0
20 - 25	8.9	4	60	-229,956	2	85	3,350.0	0	0	0.0	0	0
25 - 30	10.7	0	0	-275,947	2	71	4,020.0	0	0	0.0	0	0
30 - 35	12.5	0	0	-321,938	3	118	4,690.0	0	0	0.0	0	0
35 - 40	14.3	1	20	-367,929	0	0	5,360.0	0	0	0.0	0	0
40 - 45	16.1	1	11	-413,921	0	0	6,030.0	0	0	0.0	0	0
45 - 50	17.9	0	0	-459,912	0	0	6,700.0	21	1,825	0.0	0	0
50 - 55	19.6	0	0	-505,903	0	0	7,370.0	0	0	0.0	0	0
55 - 60	21.4	0	0	-551,894	0	0	8,040.0	0	0	0.0	0	0
60 - 65	23.2	0	0	-597,885	0	0	8,710.0	0	0	0.0	0	0
65 - 70	25.0	0	0	-643,876	0	0	9,380.0	0	0	0.0	0	0
70 - 75	26.8	0	0	-689,868	0	0	10,050.0	0	0	0.0	0	0
75 - 80	28.6	0	0	-735,859	0	0	10,720.0	0	0	0.0	0	0
80 - 85	30.3	0	0	-781,850	0	0	11,390.0	0	0	0.0	0	0
85 - 90	32.1	0	0	-827,841	0	0	12,060.0	0	0	0.0	0	0
90 - 95	33.9	0	0	-873,832	0	0	12,730.0	0	0	0.0	0	0
95 - 100	35.7	0	0	-919,824	0	0	13,400.0	38	3,285	0.0	0	0
Hours Off	0.0	0	7,260	0	0	4,469	0.0	0	0	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4  
COMBINED ECOS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	Zone Number					
	1	3	5	2	4	6

Max. Temp.	78.4	78.7	78.9	91.0	102.5	95.6
Mo./Hr.	7 14	7 14	7 14	9 21	9 22	8 21
Day Type	1	1	1	5	1	2

	Number of Hours					
Above 100	0	0	0	0	1,464	0
95 - 100	0	0	0	0	489	621
90 - 95	0	0	0	720	478	1,587
85 - 90	0	0	0	1,692	699	267
80 - 85	0	0	0	1,240	476	917
75 - 80	2,928	2,948	3,044	1,260	370	436
70 - 75	1,248	1,144	1,124	968	845	636
65 - 70	4,584	4,668	4,592	2,880	3,939	4,296
60 - 65	0	0	0	0	0	0
55 - 60	0	0	0	0	0	0
50 - 55	0	0	0	0	0	0
Below 50	0	0	0	0	0	0

Min. Temp.	66.6	66.2	66.5	67.9	67.9	67.9
Mo./Hr.	2 15	2 15	2 15	2 23	3 22	3 21
Day Type	2	2	2	1	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4  
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	STEAM On Peak (Therm)	STEAM DMND On Peak (Thrm/hr)
Jan	7,847	18	898	3
Feb	7,090	18	895	3
March	7,912	18	558	2
April	6,291	18	178	1
May	4,152	13	0	0
June	7,021	28	0	0
July	10,451	42	0	0
Aug	7,300	34	0	0
Sept	4,074	28	0	0
Oct	4,573	18	25	1
Nov	7,483	18	340	1
Dec	7,815	18	730	3
Total	82,009	42	3,624	3

Building Energy Consumption = 34,367 (Btu/Sq Ft/Year)  
Source Energy Consumption = 70,790 (Btu/Sq Ft/Year)

Floor Area = 18,688 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION -----

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	2472	2234	2534	2383	2503	2444	2442	2534	2383	2503	2383	2442	29,257
	PK	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1121L	AIR-CLD RECIP 35-60 TONS												
	ELEC	0	0	0	0	0	1142	2630	1175	12	0	0	0	4,959
	PK	0.0	0.0	0.0	0.0	0.0	9.4	25.0	18.8	9.1	0.0	0.0	0.0	25.0
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	0	142	314	145	1	0	0	0	602
	PK	0.0	0.0	0.0	0.0	0.0	0.8	2.6	2.0	0.9	0.0	0.0	0.0	2.6
1	EQ5001	CHILLED WATER PUMP C.V.												
	ELEC	0	0	0	0	0	1601	3226	1695	80	0	0	0	6,602
	PK	0.0	0.0	0.0	0.0	0.0	5.0	5.0	5.0	5.0	0.0	0.0	0.0	5.0
1	EQ5313	CONTROLS												
	ELEC	0	0	0	0	0	97	195	102	5	0	0	0	398
	PK	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4003	FC CENTRIF. FAN C.V.												
	ELEC	1200	1084	1200	1161	1200	1161	1200	1200	1161	1200	1161	1200	14,130
	PK	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
1	EQ4003	FC CENTRIF. FAN C.V.												

[illegible]

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4  
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 42.0 (kW)  
Yearly Time of Peak 16 (hr) 7 (mo)

Hour 16 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
Cooling Equipment				
1	EQ1121L	AIR-CLD RECIP 35-60 TONS	28.9	68.89
Sub Total			28.9	68.89
Sub Total			0.0	0.00
Air Moving Equipment				
1		SUMMATION OF FAN ELECTRICAL DEMAND	3.7	8.86
Sub Total			3.7	8.86
Sub Total			0.0	0.00
Miscellaneous				
	Lights		9.3	22.25
	Base Utilities		0.0	0.00
	Misc Equipment		0.0	0.00
Sub Total			9.3	22.25
Grand Total			42.0	100.00

*Building 452*  
*Trace Input File*

933702



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LINE #	
1	JOB - 1
2	01/ENERGY SAVINGS OPPORTUNITY STUDY
3	01/CARLISLE BARRACKS, PA
4	01/DEPARTMENT OF THE ARMY
5	01/BENATEC ASSOCIATES
6	01/BUILDING 452
7	08/CARLISLE
8	09/MAY/SEP////APR/OCT
9	10/CLTD-CLF
10	11///ZONE
11	LOAD - 1
12	19/1/BASE BUILDING
13	20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
14	20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
15	20/03/01/ASSEMBLY/2063/1/3/2/2
16	20/04/02/NAVE/4935/1/3/0/0/25
17	20/05/03/CLASS RM/1310/1/3/2/2
18	20/06/03/CLASS RM/1664/1/3/2/2
19	20/07/03/VESTIBULE/128/1/3/2/2
20	20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
21	21/01////CBADCTX///CBADHTX/ROOM
22	21/02////CBADCTX///CBADHTX/ROOM
23	21/03////CBADCTX///CBADHTX/ROOM
24	21/04////CBCHCTX///CBCHHTX/ROOM
25	21/05////CBADCTX///CBADHTX/ROOM
26	21/06////CBADCTX///CBADHTX/ROOM
27	21/07////CBADCTX///CBADHTX/ROOM
28	21/08////////CBADHTX/ROOM
29	22/01/1/NO/130/15//154/135
30	22/02/1/NO/150/17//154/315
31	22/03/1/NO/43/22//154/45
32	22/03/2/NO/43/22//154/225
33	22/04/1/NO/103/26//111/45
34	22/04/2/NO/103/26//111/225
35	22/05/1/NO/86/21//154/45
36	22/06/1/NO/106/21//154/225
37	22/07/1/NO/18/5.5//154/45
38	22/07/2/NO/18/5.5//154/225
39	22/08/1/YES////146
40	24/01/1/168/1/1/114/45
41	24/01/2/1365/1/1/114/135
42	24/02/1/168/1/1/114/45
43	24/02/2/1610/1/1/114/315
44	24/03/1/559/1/1/114/45
45	24/03/2/520/1/1/114/135
46	24/03/3/559/1/1/114/225
47	24/04/1/1430/1/1/114/45
48	24/04/2/1056/1/1/114/135
49	24/04/3/2040/1/1/114/225
50	24/04/4/705/1/1/114/315
51	24/05/1/860/1/1/114/45
52	24/05/2/170/1/1/114/315
53	24/06/1/150/1/1/114/135
54	24/06/2/1060/1/1/114/225
55	24/06/3/170/1/1/114/315
56	24/07/1/120/1/1/114/45
57	24/07/2/120/1/1/114/225
58	24/08/1/810/1/1/114/45

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LINE #	-----
59	24/08/2/170/1/1/114/135
60	24/08/3/540/1/1/114/225
61	24/08/4/480/1/1/114/315
62	25/01/2///25/.56/.82
63	25/02/2///25/.56/.82
64	25/03/1///20/.56/.82
65	25/03/2///20/.56/.82
66	25/03/3///20/.56/.82
67	25/04/1///40/.56/.82
68	25/04/2///28/.56/.82
69	25/04/3///45/.56/.82
70	25/04/4///28/.56/.82
71	25/05/1///20/.56/.82
72	25/05/2///5/.56/.82
73	25/06/1///5/.56/.82
74	25/06/2///20/.56/.82
75	25/07/1///80/.56/.82
76	25/07/2///80/.56/.82
77	26/01/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
78	26/02/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
79	26/03/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
80	26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
81	26/05/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
82	26/06/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
83	26/07/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
84	26/08/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBAP&L
85	27/01/8/PEOPLE/220/200/1.5/WATT-SF
86	27/02/30/PEOPLE/220/200/1.5/WATT-SF
87	27/03/30/PEOPLE/220/200/1.5/WATT-SF
88	27/04/70/PEOPLE/220/200/1.0/WATT-SF
89	27/05/30/PEOPLE/220/200/1.5/WATT-SF
90	27/06/30/PEOPLE/220/200/1.5/WATT-SF
91	29/01/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
92	29/02/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
93	29/03/15/PCT-MCLG/15/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
94	29/04/20/PCT-MCLG/20/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
95	29/05/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
96	29/07/0/PCT-MCLG/0/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
97	31/04/1/35/10/.1//CONSTANT/80/55
98	SYSTEM - 1
99	39/1/BASE BUILDING
100	40/01/UV
101	41/01/01/03
102	42/01/.3
103	44/01
104	45/01/CBADCLG/CBADCLG////CBADHTG
105	48/01
106	40/02/SZ
107	41/02/02/02
108	42/02/.625
109	44/02/DRY-BULB/65/100
110	45/02/CBCHCLG/CBCHCLG////CBCHHTG
111	48/02/35
112	40/03/UH
113	41/03/04/04
114	42/03
115	45/03/OFF/OFF////CBADHTG
116	EQUIPMENT - 1

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LINE #	
117	59/1/CARLISLE///BASE BUILDING
118	60/01/1/BLKPLANT/01/02
119	62/01/EQ1122L/1/85/TONS
120	63/01/7.5/HP
121	65/01/1//01/03
122	67/01/EQ2001/1/7.5/HP/1805/MBH
123	69/01/EQ4372
124	69/02/EQ4003
125	69/03
126	LOAD - 2
127	19/2/WALL & ROOF INSULATION
128	20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
129	20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
130	20/03/01/ASSEMBLY/2063/1/3/2/2
131	20/04/02/NAVE/4935/1/3/0/0/25
132	20/05/03/CLASS RM/1310/1/3/2/2
133	20/06/03/CLASS RM/1664/1/3/2/2
134	20/07/03/VESTIBULE/128/1/3/2/2
135	20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
136	21/01////CBADCTX//CBADHTX/ROOM
137	21/02////CBADCTX//CBADHTX/ROOM
138	21/03////CBADCTX//CBADHTX/ROOM
139	21/04////CBCHCTX//CBCHHTX/ROOM
140	21/05////CBADCTX//CBADHTX/ROOM
141	21/06////CBADCTX//CBADHTX/ROOM
142	21/07////CBADCTX//CBADHTX/ROOM
143	21/08////////CBADHTX/ROOM
144	22/01/1/NO/130/15//191/135
145	22/02/1/NO/150/17//191/315
146	22/03/1/NO/43/22//191/45
147	22/03/2/NO/43/22//191/225
148	22/04/1/NO/103/26//112/45
149	22/04/2/NO/103/26//112/225
150	22/05/1/NO/86/21//191/45
151	22/06/1/NO/106/21//191/225
152	22/07/1/NO/18/5.5//191/45
153	22/07/2/NO/18/5.5//191/225
154	22/08/1/YES////144
155	24/01/1/168/1/1/113/45
156	24/01/2/1365/1/1/113/135
157	24/02/1/168/1/1/113/45
158	24/02/2/1610/1/1/113/315
159	24/03/1/559/1/1/113/45
160	24/03/2/520/1/1/113/135
161	24/03/3/559/1/1/113/225
162	24/04/1/1430/1/1/113/45
163	24/04/2/1056/1/1/113/135
164	24/04/3/2040/1/1/113/225
165	24/04/4/705/1/1/113/315
166	24/05/1/860/1/1/113/45
167	24/05/2/170/1/1/113/315
168	24/06/1/150/1/1/113/135
169	24/06/2/1060/1/1/113/225
170	24/06/3/170/1/1/113/315
171	24/07/1/120/1/1/113/45
172	24/07/2/120/1/1/113/225
173	24/08/1/810/1/1/113/45
174	24/08/2/170/1/1/113/135.

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LINE #	
175	24/08/3/540/1/1/113/225
176	24/08/4/480/1/1/113/315
177	25/01/2///25/.56/.82
178	25/02/2///25/.56/.82
179	25/03/1///20/.56/.82
180	25/03/2///20/.56/.82
181	25/03/3///20/.56/.82
182	25/04/1///40/.56/.82
183	25/04/2///28/.56/.82
184	25/04/3///45/.56/.82
185	25/04/4///28/.56/.82
186	25/05/1///20/.56/.82
187	25/05/2///5/.56/.82
188	25/06/1///5/.56/.82
189	25/06/2///20/.56/.82
190	25/07/1///80/.56/.82
191	25/07/2///80/.56/.82
192	26/01/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
193	26/02/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
194	26/03/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
195	26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
196	26/05/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
197	26/06/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
198	26/07/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
199	26/08/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBAP&L
200	27/01/8/PEOPLE/220/200/1.5/WATT-SF
201	27/02/30/PEOPLE/220/200/1.5/WATT-SF
202	27/03/30/PEOPLE/220/200/1.5/WATT-SF
203	27/04/70/PEOPLE/220/200/1.0/WATT-SF
204	27/05/30/PEOPLE/220/200/1.5/WATT-SF
205	27/06/30/PEOPLE/220/200/1.5/WATT-SF
206	29/01/10/PCT-MCLG/10/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
207	29/02/10/PCT-MCLG/10/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
208	29/03/15/PCT-MCLG/15/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
209	29/04/20/PCT-MCLG/20/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
210	29/05/10/PCT-MCLG/10/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
211	29/07/0/PCT-MCLG/0/PCT-MHTG/.27/CFM-SF/.27/CFM-SF
212	31/04/1/35/10/.1//CONSTANT/80/55
213	SYSTEM - 2
214	39/2/WALL & ROOF INSULATION
215	40/01/UV
216	41/01/01/03
217	42/01/.3
218	44/01
219	45/01/CBADCLG/CBADCLG///CBADHTG
220	48/01
221	40/02/SZ
222	41/02/02/02
223	42/02/.625
224	44/02/DRY-BULB/65/100
225	45/02/CBCHCLG/CBCHCLG///CBCHHTG
226	48/02/35
227	40/03/UH
228	41/03/04/04
229	42/03
230	45/03/OFF/OFF///CBADHTG
231	EQUIPMENT - 2
232	59/2/CARLISLE//WALL & ROOF INSULATION

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LINE #	-----
233	60/01/1/BLKPLANT/01/02
234	62/01/EQ1122L/1/85/TONS
235	63/01/7.5/HP
236	65/01/1//01/03
237	67/01/EQ2001/1/7.5/HP/1805/MBH
238	69/01/EQ4372
239	69/02/EQ4003
240	69/03
241	LOAD - 3
242	19/3/WEATHERSTRIP & CAULKING
243	20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
244	20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
245	20/03/01/ASSEMBLY/2063/1/3/2/2
246	20/04/02/NAVE/4935/1/3/0/0/25
247	20/05/03/CLASS RM/1310/1/3/2/2
248	20/06/03/CLASS RM/1664/1/3/2/2
249	20/07/03/VESTIBULE/128/1/3/2/2
250	20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
251	21/01////CBADCTX///CBADHTX/ROOM
252	21/02////CBADCTX///CBADHTX/ROOM
253	21/03////CBADCTX///CBADHTX/ROOM
254	21/04////CBCHCTX///CBCHHTX/ROOM
255	21/05////CBADCTX///CBADHTX/ROOM
256	21/06////CBADCTX///CBADHTX/ROOM
257	21/07////CBADCTX///CBADHTX/ROOM
258	21/08////////CBADHTX/ROOM
259	22/01/1/NO/130/15//154/135
260	22/02/1/NO/150/17//154/315
261	22/03/1/NO/43/22//154/45
262	22/03/2/NO/43/22//154/225
263	22/04/1/NO/103/26//111/45
264	22/04/2/NO/103/26//111/225
265	22/05/1/NO/86/21//154/45
266	22/06/1/NO/106/21//154/225
267	22/07/1/NO/18/5.5//154/45
268	22/07/2/NO/18/5.5//154/225
269	22/08/1/YES////146
270	24/01/1/168/1/1/114/45
271	24/01/2/1365/1/1/114/135
272	24/02/1/168/1/1/114/45
273	24/02/2/1610/1/1/114/315
274	24/03/1/559/1/1/114/45
275	24/03/2/520/1/1/114/135
276	24/03/3/559/1/1/114/225
277	24/04/1/1430/1/1/114/45
278	24/04/2/1056/1/1/114/135
279	24/04/3/2040/1/1/114/225
280	24/04/4/705/1/1/114/315
281	24/05/1/860/1/1/114/45
282	24/05/2/170/1/1/114/315
283	24/06/1/150/1/1/114/135
284	24/06/2/1060/1/1/114/225
285	24/06/3/170/1/1/114/315
286	24/07/1/120/1/1/114/45
287	24/07/2/120/1/1/114/225
288	24/08/1/810/1/1/114/45
289	24/08/2/170/1/1/114/135
290	24/08/3/540/1/1/114/225.

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LINE #	-----
291	24/08/4/480/1/1/114/315
292	25/01/2///25/.56/.82
293	25/02/2///25/.56/.82
294	25/03/1///20/.56/.82
295	25/03/2///20/.56/.82
296	25/03/3///20/.56/.82
297	25/04/1///40/.56/.82
298	25/04/2///28/.56/.82
299	25/04/3///45/.56/.82
300	25/04/4///28/.56/.82
301	25/05/1///20/.56/.82
302	25/05/2///5/.56/.82
303	25/06/1///5/.56/.82
304	25/06/2///20/.56/.82
305	25/07/1///80/.56/.82
306	25/07/2///80/.56/.82
307	26/01/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
308	26/02/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
309	26/03/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
310	26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
311	26/05/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
312	26/06/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
313	26/07/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
314	26/08/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBAP&L
315	27/01/8/PEOPLE/220/200/1.5/WATT-SF
316	27/02/30/PEOPLE/220/200/1.5/WATT-SF
317	27/03/30/PEOPLE/220/200/1.5/WATT-SF
318	27/04/70/PEOPLE/220/200/1.0/WATT-SF
319	27/05/30/PEOPLE/220/200/1.5/WATT-SF
320	27/06/30/PEOPLE/220/200/1.5/WATT-SF
321	29/01/10/PCT-MCLG/10/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
322	29/02/10/PCT-MCLG/10/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
323	29/03/15/PCT-MCLG/15/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
324	29/04/20/PCT-MCLG/20/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
325	29/05/10/PCT-MCLG/10/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
326	29/07/0/PCT-MCLG/0/PCT-MHTG/.25/CFM-SF/.25/CFM-SF
327	31/04/1/35/10/.1//CONSTANT/80/55
328	SYSTEM - 3
329	39/3/WEATHERSTRIP & CAULKING
330	40/01/UV
331	41/01/01/03
332	42/01/.3
333	44/01
334	45/01/CBADCLG/CBADCLG////CBADHTG
335	48/01
336	40/02/SZ
337	41/02/02/02
338	42/02/.625
339	44/02/DRY-BULB/65/100
340	45/02/CBCHCLG/CBCHCLG////CBCHHTG
341	48/02/35
342	40/03/UH
343	41/03/04/04
344	42/03
345	45/03/OFF/OFF////CBADHTG
346	EQUIPMENT - 3
347	59/3/CARLISLE//WEATHERSTRIP & CAULKING
348	60/01/1/BLKPLANT/01/02 .

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LINE #	-----
349	62/01/EQ1122L/1/85/TONS
350	63/01/7.5/HP
351	65/01/1//01/03
352	67/01/EQ2001/1/7.5/HP/1805/MBH
353	69/01/EQ4372
354	69/02/EQ4003
355	69/03
356	LOAD - 4
357	19/4/REPLACE FLUORESCENT LAMPS
358	20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
359	20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
360	20/03/01/ASSEMBLY/2063/1/3/2/2
361	20/04/02/NAVE/4935/1/3/0/0/25
362	20/05/03/CLASS RM/1310/1/3/2/2
363	20/06/03/CLASS RM/1664/1/3/2/2
364	20/07/03/VESTIBULE/128/1/3/2/2
365	20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
366	21/01/////CBADCTX///CBADHTX/ROOM
367	21/02/////CBADCTX///CBADHTX/ROOM
368	21/03/////CBADCTX///CBADHTX/ROOM
369	21/04/////CBCHCTX///CBCHHTX/ROOM
370	21/05/////CBADCTX///CBADHTX/ROOM
371	21/06/////CBADCTX///CBADHTX/ROOM
372	21/07/////CBADCTX///CBADHTX/ROOM
373	21/08/////CBADHTX/ROOM
374	22/01/1/NO/130/15//154/135
375	22/02/1/NO/150/17//154/315
376	22/03/1/NO/43/22//154/45
377	22/03/2/NO/43/22//154/225
378	22/04/1/NO/103/26//111/45
379	22/04/2/NO/103/26//111/225
380	22/05/1/NO/86/21//154/45
381	22/06/1/NO/106/21//154/225
382	22/07/1/NO/18/5.5//154/45
383	22/07/2/NO/18/5.5//154/225
384	22/08/1/YES////146
385	24/01/1/168/1/1/114/45
386	24/01/2/1365/1/1/114/135
387	24/02/1/168/1/1/114/45
388	24/02/2/1610/1/1/114/315
389	24/03/1/559/1/1/114/45
390	24/03/2/520/1/1/114/135
391	24/03/3/559/1/1/114/225
392	24/04/1/1430/1/1/114/45
393	24/04/2/1056/1/1/114/135
394	24/04/3/2040/1/1/114/225
395	24/04/4/705/1/1/114/315
396	24/05/1/860/1/1/114/45
397	24/05/2/170/1/1/114/315
398	24/06/1/150/1/1/114/135
399	24/06/2/1060/1/1/114/225
400	24/06/3/170/1/1/114/315
401	24/07/1/120/1/1/114/45
402	24/07/2/120/1/1/114/225
403	24/08/1/810/1/1/114/45
404	24/08/2/170/1/1/114/135
405	24/08/3/540/1/1/114/225
406	24/08/4/480/1/1/114/315.

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LINE #	-----
407	25/01/2///25/.56/.82
408	25/02/2///25/.56/.82
409	25/03/1///20/.56/.82
410	25/03/2///20/.56/.82
411	25/03/3///20/.56/.82
412	25/04/1///40/.56/.82
413	25/04/2///28/.56/.82
414	25/04/3///45/.56/.82
415	25/04/4///28/.56/.82
416	25/05/1///20/.56/.82
417	25/05/2///5/.56/.82
418	25/06/1///5/.56/.82
419	25/06/2///20/.56/.82
420	25/07/1///80/.56/.82
421	25/07/2///80/.56/.82
422	26/01/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
423	26/02/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
424	26/03/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
425	26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
426	26/05/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
427	26/06/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
428	26/07/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
429	26/08/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBAP&L
430	27/01/8/PEOPLE/220/200/1.4/WATT-SF
431	27/02/30/PEOPLE/220/200/1.4/WATT-SF
432	27/03/30/PEOPLE/220/200/1.4/WATT-SF
433	27/04/70/PEOPLE/220/200/1.0/WATT-SF
434	27/05/30/PEOPLE/220/200/1.4/WATT-SF
435	27/06/30/PEOPLE/220/200/1.4/WATT-SF
436	29/01/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
437	29/02/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
438	29/03/15/PCT-MCLG/15/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
439	29/04/20/PCT-MCLG/20/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
440	29/05/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
441	29/07/0/PCT-MCLG/0/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
442	31/04/1/35/10/.1//CONSTANT/80/55
443	SYSTEM - 4
444	39/4/REPLACE FLUORESCENT LAMPS
445	40/01/UV
446	41/01/01/03
447	42/01/.3
448	44/01
449	45/01/CBADCLG/CBADCLG///CBADHTG
450	48/01
451	40/02/SZ
452	41/02/02/02
453	42/02/.625
454	44/02/DRY-BULB/65/100
455	45/02/CBCHCLG/CBCHCLG///CBCHHTG
456	48/02/35
457	40/03/UH
458	41/03/04/04
459	42/03
460	45/03/OFF/OFF///CBADHTG
461	EQUIPMENT - 4
462	59/4/CARLISLE///REPLACE FLUORESCENT LAMPS
463	60/01/1/BLKPLANT/01/02
464	62/01/EQ1122L/1/85/TONS



CONTENTS OF : E:\CB452.TM

LINE #	-----
465	63/01/7.5/HP
466	65/01/1//01/03
467	67/01/EQ2001/1/7.5/HP/1805/MBH
468	69/01/EQ4372
469	69/02/EQ4003
470	69/03

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LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 452

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/REPLACE FLUORESCENT BALLASTS

13 20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2

14 20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2

15 20/03/01/ASSEMBLY/2063/1/3/2/2

16 20/04/02/NAVE/4935/1/3/0/0/25

17 20/05/03/CLASS RM/1310/1/3/2/2

18 20/06/03/CLASS RM/1664/1/3/2/2

19 20/07/03/VESTIBULE/128/1/3/2/2

20 20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2

21 21/01////CBADCTX///CBADHTX/ROOM

22 21/02////CBADCTX///CBADHTX/ROOM

23 21/03////CBADCTX///CBADHTX/ROOM

24 21/04////CBCHCTX///CBCHHTX/ROOM

25 21/05////CBADCTX///CBADHTX/ROOM

26 21/06////CBADCTX///CBADHTX/ROOM

27 21/07////CBADCTX///CBADHTX/ROOM

28 21/08////////CBADHTX/ROOM

29 22/01/1/NO/130/15//154/135

30 22/02/1/NO/150/17//154/315

31 22/03/1/NO/43/22//154/45

32 22/03/2/NO/43/22//154/225

33 22/04/1/NO/103/26//111/45

34 22/04/2/NO/103/26//111/225

35 22/05/1/NO/86/21//154/45

36 22/06/1/NO/106/21//154/225

37 22/07/1/NO/18/5.5//154/45

38 22/07/2/NO/18/5.5//154/225

39 22/08/1/YES////146

40 24/01/1/168/1/1/114/45

41 24/01/2/1365/1/1/114/135

42 24/02/1/168/1/1/114/45

43 24/02/2/1610/1/1/114/315

44 24/03/1/559/1/1/114/45

45 24/03/2/520/1/1/114/135

46 24/03/3/559/1/1/114/225

47 24/04/1/1430/1/1/114/45

48 24/04/2/1056/1/1/114/135

49 24/04/3/2040/1/1/114/225

50 24/04/4/705/1/1/114/315

51 24/05/1/860/1/1/114/45

52 24/05/2/170/1/1/114/315

53 24/06/1/150/1/1/114/135

54 24/06/2/1060/1/1/114/225

55 24/06/3/170/1/1/114/315

56 24/07/1/120/1/1/114/45

57 24/07/2/120/1/1/114/225

58 24/08/1/810/1/1/114/45

CONTENTS OF : E:\CB452B.TM

LINE #	
59	24/08/2/170/1/1/114/135
60	24/08/3/540/1/1/114/225
61	24/08/4/480/1/1/114/315
62	25/01/2///25/.56/.82
63	25/02/2///25/.56/.82
64	25/03/1///20/.56/.82
65	25/03/2///20/.56/.82
66	25/03/3///20/.56/.82
67	25/04/1///40/.56/.82
68	25/04/2///28/.56/.82
69	25/04/3///45/.56/.82
70	25/04/4///28/.56/.82
71	25/05/1///20/.56/.82
72	25/05/2///5/.56/.82
73	25/06/1///5/.56/.82
74	25/06/2///20/.56/.82
75	25/07/1///80/.56/.82
76	25/07/2///80/.56/.82
77	26/01/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
78	26/02/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
79	26/03/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
80	26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
81	26/05/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
82	26/06/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
83	26/07/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
84	26/08/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBAP&L
85	27/01/8/PEOPLE/220/200/1.25/WATT-SF
86	27/02/30/PEOPLE/220/200/1.25/WATT-SF
87	27/03/30/PEOPLE/220/200/1.25/WATT-SF
88	27/04/70/PEOPLE/220/200/1.0/WATT-SF
89	27/05/30/PEOPLE/220/200/1.25/WATT-SF
90	27/06/30/PEOPLE/220/200/1.25/WATT-SF
91	29/01/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
92	29/02/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
93	29/03/15/PCT-MCLG/15/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
94	29/04/20/PCT-MCLG/20/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
95	29/05/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
96	29/07/0/PCT-MCLG/0/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
97	31/04/1/35/10/.1//CONSTANT/80/55
98	SYSTEM - 1
99	39/1/REPLACE FLUORESCENT BALLASTS
100	40/01/UV
101	41/01/01/03
102	42/01/.3
103	44/01
104	45/01/CBADCLG/CBADCLG///CBADHTG
105	48/01
106	40/02/SZ
107	41/02/02/02
108	42/02/.625
109	44/02/DRY-BULB/65/100
110	45/02/CBCHCLG/CBCHCLG///CBCHHTG
111	48/02/35
112	40/03/UH
113	41/03/04/04
114	42/03
115	45/03/OFF/OFF///CBADHTG
116	EQUIPMENT - 1

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LINE #	-----
117	59/1/CARLISLE///REPLACE FLUORESCENT BALLASTS
118	60/01/1/BLKPLANT/01/02
119	62/01/EQ1122L/1/85/TONS
120	63/01/7.5/HP
121	65/01/1//01/03
122	67/01/EQ2001/1/7.5/HP/1805/MBH
123	69/01/EQ4372
124	69/02/EQ4003
125	69/03
126	LOAD - 2
127	19/2/REPLACE FLUORESCENT FIXTURES
128	20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
129	20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
130	20/03/01/ASSEMBLY/2063/1/3/2/2
131	20/04/02/NAVE/4935/1/3/0/0/25
132	20/05/03/CLASS RM/1310/1/3/2/2
133	20/06/03/CLASS RM/1664/1/3/2/2
134	20/07/03/VESTIBULE/128/1/3/2/2
135	20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
136	21/01////CBADCTX///CBADHTX/ROOM
137	21/02////CBADCTX///CBADHTX/ROOM
138	21/03////CBADCTX///CBADHTX/ROOM
139	21/04////CBCHCTX///CBCHHTX/ROOM
140	21/05////CBADCTX///CBADHTX/ROOM
141	21/06////CBADCTX///CBADHTX/ROOM
142	21/07////CBADCTX///CBADHTX/ROOM
143	21/08////////CBADHTX/ROOM
144	22/01/1/NO/130/15//154/135
145	22/02/1/NO/150/17//154/315
146	22/03/1/NO/43/22//154/45
147	22/03/2/NO/43/22//154/225
148	22/04/1/NO/103/26//111/45
149	22/04/2/NO/103/26//111/225
150	22/05/1/NO/86/21//154/45
151	22/06/1/NO/106/21//154/225
152	22/07/1/NO/18/5.5//154/45
153	22/07/2/NO/18/5.5//154/225
154	22/08/1/YES////146
155	24/01/1/168/1/1/114/45
156	24/01/2/1365/1/1/114/135
157	24/02/1/168/1/1/114/45
158	24/02/2/1610/1/1/114/315
159	24/03/1/559/1/1/114/45
160	24/03/2/520/1/1/114/135
161	24/03/3/559/1/1/114/225
162	24/04/1/1430/1/1/114/45
163	24/04/2/1056/1/1/114/135
164	24/04/3/2040/1/1/114/225
165	24/04/4/705/1/1/114/315
166	24/05/1/860/1/1/114/45
167	24/05/2/170/1/1/114/315
168	24/06/1/150/1/1/114/135
169	24/06/2/1060/1/1/114/225
170	24/06/3/170/1/1/114/315
171	24/07/1/120/1/1/114/45
172	24/07/2/120/1/1/114/225
173	24/08/1/810/1/1/114/45
174	24/08/2/170/1/1/114/135

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LINE #	-----
175	24/08/3/540/1/1/114/225
176	24/08/4/480/1/1/114/315
177	25/01/2///25/.56/.82
178	25/02/2///25/.56/.82
179	25/03/1///20/.56/.82
180	25/03/2///20/.56/.82
181	25/03/3///20/.56/.82
182	25/04/1///40/.56/.82
183	25/04/2///28/.56/.82
184	25/04/3///45/.56/.82
185	25/04/4///28/.56/.82
186	25/05/1///20/.56/.82
187	25/05/2///5/.56/.82
188	25/06/1///5/.56/.82
189	25/06/2///20/.56/.82
190	25/07/1///80/.56/.82
191	25/07/2///80/.56/.82
192	26/01/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
193	26/02/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
194	26/03/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
195	26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
196	26/05/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
197	26/06/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
198	26/07/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
199	26/08/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBAP&L
200	27/01/8/PEOPLE/220/200/1.14/WATT-SF
201	27/02/30/PEOPLE/220/200/1.14/WATT-SF
202	27/03/30/PEOPLE/220/200/1.14/WATT-SF
203	27/04/70/PEOPLE/220/200/1.0/WATT-SF
204	27/05/30/PEOPLE/220/200/1.14/WATT-SF
205	27/06/30/PEOPLE/220/200/1.14/WATT-SF
206	29/01/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
207	29/02/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
208	29/03/15/PCT-MCLG/15/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
209	29/04/20/PCT-MCLG/20/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
210	29/05/10/PCT-MCLG/10/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
211	29/07/0/PCT-MCLG/0/PCT-MHTG/.31/CFM-SF/.31/CFM-SF
212	31/04/1/35/10/.1//CONSTANT/80/55
213	SYSTEM - 2
214	39/2/REPLACE FLUORESCENT FIXTURES
215	40/01/UV
216	41/01/01/03
217	42/01/.3
218	44/01
219	45/01/CBADCLG/CBADCLG///CBADHTG
220	48/01
221	40/02/SZ
222	41/02/02/02
223	42/02/.625
224	44/02/DRY-BULB/65/100
225	45/02/CBCHCLG/CBCHCLG///CBCHHTG
226	48/02/35
227	40/03/UH
228	41/03/04/04
229	42/03
230	45/03/OFF/OFF///CBADHTG
231	EQUIPMENT - 2
232	59/2/CARLISLE//REPLACE FLUORESCENT FIXTURES

CONTENTS OF : E:\CB452B.TM

LINE #	-----
233	60/01/1/BLKPLANT/01/02
234	62/01/EQ1122L/1/85/TONS
235	63/01/7.5/HP
236	65/01/1//01/03
237	67/01/EQ2001/1/7.5/HP/1805/MBH
238	69/01/EQ4372
239	69/02/EQ4003
240	69/03
241	LOAD - 3
242	19/3/COMBINED ECOS
243	20/01/01/CHAPLIN-CLASS RM/1700/1/3/2/2
244	20/02/01/SM CHAPEL-CLASS/2274/1/3/2/2
245	20/03/01/ASSEMBLY/2063/1/3/2/2
246	20/04/02/NAVE/4935/1/3/0/0/25
247	20/05/03/CLASS RM/1310/1/3/2/2
248	20/06/03/CLASS RM/1664/1/3/2/2
249	20/07/03/VESTIBULE/128/1/3/2/2
250	20/08/04/MECH RM-CORRIDOR/3593/1/3/2/2
251	21/01////CBADCTX//CBADHTX/ROOM
252	21/02////CBADCTX//CBADHTX/ROOM
253	21/03////CBADCTX//CBADHTX/ROOM
254	21/04////CBCHCTX//CBCHHTX/ROOM
255	21/05////CBADCTX//CBADHTX/ROOM
256	21/06////CBADCTX//CBADHTX/ROOM
257	21/07////CBADCTX//CBADHTX/ROOM
258	21/08////////CBADHTX/ROOM
259	22/01/1/NO/130/15//191/135
260	22/02/1/NO/150/17//191/315
261	22/03/1/NO/43/22//191/45
262	22/03/2/NO/43/22//191/225
263	22/04/1/NO/103/26//112/45
264	22/04/2/NO/103/26//112/225
265	22/05/1/NO/86/21//191/45
266	22/06/1/NO/106/21//191/225
267	22/07/1/NO/18/5.5//191/45
268	22/07/2/NO/18/5.5//191/225
269	22/08/1/YES////144
270	24/01/1/168/1/1/113/45
271	24/01/2/1365/1/1/113/135
272	24/02/1/168/1/1/113/45
273	24/02/2/1610/1/1/113/315
274	24/03/1/559/1/1/113/45
275	24/03/2/520/1/1/113/135
276	24/03/3/559/1/1/113/225
277	24/04/1/1430/1/1/113/45
278	24/04/2/1056/1/1/113/135
279	24/04/3/2040/1/1/113/225
280	24/04/4/705/1/1/113/315
281	24/05/1/860/1/1/113/45
282	24/05/2/170/1/1/113/315
283	24/06/1/150/1/1/113/135
284	24/06/2/1060/1/1/113/225
285	24/06/3/170/1/1/113/315
286	24/07/1/120/1/1/113/45
287	24/07/2/120/1/1/113/225
288	24/08/1/810/1/1/113/45
289	24/08/2/170/1/1/113/135
290	24/08/3/540/1/1/113/225

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LINE #	-----
291	24/08/4/480/1/1/113/315
292	25/01/2///25/.56/.82
293	25/02/2///25/.56/.82
294	25/03/1///20/.56/.82
295	25/03/2///20/.56/.82
296	25/03/3///20/.56/.82
297	25/04/1///40/.56/.82
298	25/04/2///28/.56/.82
299	25/04/3///45/.56/.82
300	25/04/4///28/.56/.82
301	25/05/1///20/.56/.82
302	25/05/2///5/.56/.82
303	25/06/1///5/.56/.82
304	25/06/2///20/.56/.82
305	25/07/1///80/.56/.82
306	25/07/2///80/.56/.82
307	26/01/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
308	26/02/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
309	26/03/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
310	26/04/CBCHP&L/CBCHP&L/CBCHCLG/AVAIL/OFF/CBCHFAN/OFF/OFF/CBCHP&L
311	26/05/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
312	26/06/CBAP&L/CBAP&L/CBADCLG/AVAIL/OFF/CBADFAN/OFF/OFF/CBAP&L
313	26/07/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/OFF
314	26/08/OFF/CBAP&L/OFF/AVAIL/OFF/OFF/CBADHTG/OFF/CBAP&L
315	27/01/8/PEOPLE/220/200/1.14/WATT-SF
316	27/02/30/PEOPLE/220/200/1.14/WATT-SF
317	27/03/30/PEOPLE/220/200/1.14/WATT-SF
318	27/04/70/PEOPLE/220/200/1.0/WATT-SF
319	27/05/30/PEOPLE/220/200/1.14/WATT-SF
320	27/06/30/PEOPLE/220/200/1.14/WATT-SF
321	29/01/10/PCT-MCLG/10/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
322	29/02/10/PCT-MCLG/10/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
323	29/03/15/PCT-MCLG/15/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
324	29/04/20/PCT-MCLG/20/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
325	29/05/10/PCT-MCLG/10/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
326	29/07/0/PCT-MCLG/0/PCT-MHTG/.21/CFM-SF/.21/CFM-SF
327	31/04/1/35/10/.1//CONSTANT/80/55
328	SYSTEM - 3
329	39/3/COMBINED ECOS
330	40/01/UV
331	41/01/01/03
332	42/01/.3
333	44/01
334	45/01/CBADCLG/CBADCLG///CBADHTG
335	48/01
336	40/02/SZ
337	41/02/02/02
338	42/02/.625
339	44/02/DRY-BULB/65/100
340	45/02/CBCHCLG/CBCHCLG///CBCHHTG
341	48/02/35
342	40/03/UH
343	41/03/04/04
344	42/03
345	45/03/OFF/OFF///CBADHTG
346	EQUIPMENT - 3
347	59/3/CARLISLE///COMBINED ECOS
348	60/01/1/BLKPLANT/01/02

CONTENTS OF : E:\CB452B.TM

LINE #	
349	62/01/EQ1122L/1/85/TONS
350	63/01/7.5/HP
351	65/01/1//01/03
352	67/01/EQ2001/1/7.5/HP/1805/MBH
353	69/01/EQ4372
354	69/02/EQ4003
355	69/03



*Building 452*  
*Trace Output File*

933702

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**          TRACE 600 ANALYSIS          **  
**  
**          by          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 452

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 11:44:10 2/ 3/94  
Dataset Name: CB452 .TM

AIRFLOW - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	UV	4,581	31,315	31,315	34,865	8,130	0	0
2	SZ	3,368	16,839	16,839	18,461	16,839	0	0
3	UH	0	0	2,078	0	0	0	0
Totals		7,949	48,154	50,232	53,325	24,970	0	0

CAPACITY - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling					Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Sys. Opt. Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	UV	73.4	0.0	0.0	0.0	73.4	-1,080,515	0	0	0	0	0	-1,080,515
2	SZ	29.4	0.0	0.0	0.0	29.4	-432,496	0	0	0	0	0	-432,496
3	UH	0.0	0.0	0.0	0.0	0.0	-128,877	0	0	0	0	0	-128,877
Totals		102.8	0.0	0.0	0.0	102.8	-1,641,887	0	0	0	0	0	-1,641,887

The building peaked at hour 16 month 7 with a capacity of 102.3 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
BASE BUILDING

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	UV	14.63	2.23	426.6	191.7	62.59	2.23	-76.77	14,074
2	Main	SZ	20.00	3.41	572.0	167.6	71.58	3.41	-87.64	4,935
3	Main	UH	0.00	0.00	0.0	0.0	0.00	0.58	-35.87	3,593

System 1 Block UV - UNIT VENTILATOR

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)		Space Sensible (Btuh)	Perct Of Tot (%)		Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,277		90,533	10.28	*	44,331	7.87	*	-38,497	-71,868	7.00
Glass Solar	195,227	0		195,227	22.16	*	212,025	37.63	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.15	*	26,479	4.70	*	-133,751	-133,751	13.02
Wall Cond	154,963	25,523		180,486	20.49	*	165,455	29.36	*	-490,481	-574,101	55.88
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.04
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	136,320			136,320	15.48	*	55,492	9.85	*	-247,207	-247,207	24.06
Sub Total==>	560,723	69,800		630,523	71.58	*	503,957	89.44	*	-910,391	-1,027,382	100.00
Internal Loads												
Lights	36,835	0		36,835	4.18	*	30,432	5.40	*	0	0	0.00
People	49,545			49,545	5.62	*	20,293	3.60	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	86,379	0	0	86,379	9.81	*	50,724	9.00	*	0	0	0.00
Ceiling Load	10,143	-10,143		0	0.00	*	8,772	1.56	*	-11,988	0	0.00
Outside Air	0	0	0	175,930	19.97	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,681	0.76	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat PkUp		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-18,645	0	-18,645	-2.12	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	657,245	41,013	0	880,869	100.00	*	563,454	100.00	*	-922,379	-1,027,382	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor Part ExFlr Roof Wall	AREAS Glass (sf) (%)
Main Clg	73.4	880.9	31,315	80.5 65.2 71.1	58.4 56.1 65.4	14,074	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	350	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0	
Totals	73.4	880.9				15,978	0 0
						12,830	3,646 28

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	ENGINEERING CHECKS--	TEMPERATURES (F)---
Main Htg	-1,080.5	31,315	63.4	95.1	Vent	4,581	0	Clg % OA 14.6	Type Clg Htg
Aux Htg	0.0	0	0.0	0.0	Infil	3,550	3,550	Clg Cfm/Sqft 2.23	SADB 58.5 95.1
Preheat	-0.0	31,315	62.0	58.3	Supply	31,315	31,315	Clg Cfm/Ton 426.60	Plenum 78.7 59.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton 191.73	Return 78.7 63.7
Humidif	0.0	0	0.0	0.0	Return	31,315	31,315	Clg Btuh/Sqft 62.59	Ret/OA 80.5 63.7
Opt Vent	0.0	0	0.0	0.0	Exhaust	4,581	0	No. People 198	Runarnd 75.0 68.0
Total	-1,080.5				Rm Exh	0	0	Htg % OA 0.0	Fn MtrTD 0.0 0.0
					Auxil	0	0	Htg Cfm/Sqft 2.23	Fn BldTD 0.0 0.0
								Htg Btuh/Sqft -76.77	Fn Frict 0.1 0.0

System 2 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/12 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 87/ 72/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct	Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot	Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)	(Btuh)	(Btuh)	(%)
Envelope Loads											
Skylite Solr	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Roof Cond	30,496	0	0	30,496	8.63	*	44,331	16.20	-38,497	-38,497	8.90
Glass Solar	75,357	0	0	75,357	21.33	*	117,002	42.76	0	0	0.00
Glass Cond	10,550	0	0	10,550	2.99	*	14,326	5.24	-72,739	-72,739	16.82
Wall Cond	42,873	0	0	42,873	12.14	*	72,429	26.47	-207,867	-207,867	48.06
Partition	175	0	0	175	0.05	*	175	0.06	-455	-455	0.11
Exposed Floor	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Infiltration	55,749	0	0	55,749	15.78	*	25,059	9.16	-112,938	-112,938	26.11
Sub Total==>	215,200	0	0	215,200	60.92	*	273,320	99.88	-432,496	-432,496	100.00
Internal Loads											
Lights	4,548	0	0	4,548	1.29	*	168	0.06	0	0	0.00
People	10,542	0	0	10,542	2.98	*	154	0.06	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.27	*	322	0.12	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Outside Air	0	0	0	115,783	32.78	*	0	0.00	0	0	0.00
Sup. Fan Heat	0	0	0	7,185	2.03	*	0	0.00	0	0	0.00
Ret. Fan Heat	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Duct Heat PkUp	0	0	0	0	0.00	*	0	0.00	0	0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Terminal Bypass	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Grand Total==>	230,290	0	0	353,258	100.00	*	273,643	100.00	-432,496	-432,496	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	29.4	353.3	238.8	77.4 64.5 72.8	59.7 57.8 70.3	4,935		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	350		
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	29.4	353.3				5,356	0	0
						5,231	1,983	38

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	20.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F								
Main Htg	-432.5	16,839	68.0	91.6	Vent	3,368	0	Clg Cfm/Sqft	3.41	SADB	60.1	91.6
Aux Htg	0.0	0	0.0	0.0	Infil	1,622	1,622	Clg Cfm/Ton	572.02	Plenum	75.0	68.0
Preheat	-0.0	16,839	68.0	59.7	Supply	16,839	16,839	Clg Sqft/Ton	167.64	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	71.58	Ret/OA	77.4	68.0
Humidif	0.0	0	0.0	0.0	Return	16,839	16,839	No. People	70	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	3,368	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Total	-432.5				Rm Exh	0	0	Htg Cfm/Sqft	3.41	Fn BldTD	0.1	0.0
					Auxil	0	0	Htg Btuh/Sqft	-87.64	Fn Frict	0.2	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-10,810	8.39
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-118,067	91.61
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-128,877	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-26,477	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	AREAS Glass (sf) (%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	3,593 0
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0 0
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	3,593 0 0
Totals	0.0	0.0				Wall	2,000 0 0

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	--ENGINEERING CHECKS-- Clg % GA 0.0	--TEMPERATURES (F)-- Type Clg Htg
Main Htg	-128.9	2,078	68.0	125.0	Vent	0	0	Clg Cfm/Sqft 0.00	SADB 0.0 125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	0	Clg Cfm/Ton 0.00	Plenum 0.0 43.2
Preheat	0.0	0	0.0	0.0	Supply	0	2,078	Clg Sqft/Ton 0.00	Return 0.0 68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft 0.00	Ret/OA 0.0 68.0
Humidif	0.0	0	0.0	0.0	Return	0	2,078	No. People 0	Runarnd 0.0 68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA 0.0	Fn MtrTD 0.0 0.0
Total	-128.9				Rm Exh	0	0	Htg Cfm/SqFt 0.58	Fn BldTD 0.0 0.0
					Auxil	0	0	Htg Btuh/SqFt -35.97	Fn Frict 0.0 0.0

BUILDING U-VALUES - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2	17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9	16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4	16.14
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1	16.60
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
5	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3	17.49
6	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5	18.15
7	VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7	13.66
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3	17.69
System 1	Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3	16.95
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
System 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5	16.46

BUILDING AREAS - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.				6,037	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	0	198	192	80	48
Zone	3 Total/Ave.				3,102	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.				14,074	350	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
Building					22,602	700	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
BASE BUILDING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)



SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.1	18	144	-82,094	48	1,250	2,511.6	53	3,372	0.0	0	0
5 - 10	10.3	29	240	-164,189	10	255	5,023.2	0	0	0.0	0	0
10 - 15	15.4	17	137	-246,283	5	133	7,534.8	0	0	0.0	0	0
15 - 20	20.6	6	51	-328,377	5	137	10,046.4	14	856	0.0	0	0
20 - 25	25.7	11	86	-410,472	1	26	12,558.0	18	1,160	0.0	0	0
25 - 30	30.9	5	38	-492,566	1	14	15,069.6	0	0	0.0	0	0
30 - 35	36.0	0	0	-574,661	15	379	17,581.2	0	0	0.0	0	0
35 - 40	41.1	0	0	-656,755	1	33	20,092.8	0	0	0.0	0	0
40 - 45	46.3	5	37	-738,849	0	0	22,604.4	0	0	0.0	0	0
45 - 50	51.4	0	0	-820,944	0	0	25,116.1	0	0	0.0	0	0
50 - 55	56.6	0	0	-903,038	2	47	27,627.7	0	0	0.0	0	0
55 - 60	61.7	1	8	-985,133	6	154	30,139.3	0	0	0.0	0	0
60 - 65	66.8	5	37	-1,067,227	2	42	32,650.9	0	0	0.0	0	0
65 - 70	72.0	5	40	-1,149,321	1	21	35,162.5	3	168	0.0	0	0
70 - 75	77.1	0	0	-1,231,416	0	4	37,674.1	4	266	0.0	0	0
75 - 80	82.3	0	0	-1,313,510	2	50	40,185.7	0	0	0.0	0	0
80 - 85	87.4	0	0	-1,395,605	1	37	42,697.3	0	0	0.0	0	0
85 - 90	92.6	0	0	-1,477,699	1	20	45,203.9	8	504	0.0	0	0
90 - 95	97.7	0	0	-1,559,793	0	0	47,720.5	0	0	0.0	0	0
95 - 100	102.8	0	0	-1,641,888	0	0	50,232.1	0	0	0.0	0	0
Hours Off	0.0	0	7,942	0	0	6,158	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	Zone Number				
	1	2	3	2	4

Max. Temp.	89.0	97.8	99.5	98.0	91.3
Mo./Hr.	7 24	7 23	7 24	7 23	7 24
Day Type	4	1	1	1	1

	Number of Hours				
Above 100	0	0	0	0	0
95 - 100	0	45	417	45	0
90 - 95	0	479	1,147	390	90
85 - 90	363	1,059	748	1,058	971
80 - 85	1,338	1,278	882	1,250	1,243
75 - 80	1,879	731	529	853	1,013
70 - 75	241	229	357	225	355
65 - 70	1,988	1,419	514	1,425	1,963
60 - 65	1,197	956	932	954	1,334
55 - 60	538	559	529	572	752
50 - 55	462	892	789	875	1,039
Below 50	754	1,113	1,916	1,113	0

Min. Temp.	36.6	38.4	36.6	38.5	54.9
Mo./Hr.	2 7	2 12	2 12	2 11	1 7
Day Type	5	3	4	3	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	GAS	GAS DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	8,726	37	2,082	17
Feb	7,941	37	1,874	17
March	7,622	37	1,408	17
April	6,222	37	448	11
May	5,558	56	0	0
June	10,342	107	0	0
July	13,213	116	0	0
Aug	10,470	106	0	0
Sept	4,855	81	0	0
Oct	6,583	37	451	11
Nov	7,170	37	1,220	14
Dec	8,043	37	1,826	17
Total	96,746	116	9,308	17

Building Energy Consumption = 55,792 (Btu/Sq Ft/Year)  
Source Energy Consumption = 87,182 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total	
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec		
0	LIGHTS														
	ELEC	3056	2740	3195	2868	3126	3066	2928	3195	2868	3126	2987	2928	36,082	
	PK	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	
1	MISC LD														
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	MISC LD														
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	MISC LD														
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	MISC LD														
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5	MISC LD														
	P HOTW20	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
6	MISC LD														
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	EQ1122L		AIR-CLD RECIP >55 TONS												
	ELEC	0	0	0	0	371	3581	6094	3633	219	0	0	0	13,898	
	PK	0.0	0.0	0.0	0.0	22.8	64.8	73.2	64.6	40.0	0.0	0.0	0.0	73.2	
1	EQ5200		CONDENSER FANS												
	ELEC	0	0	0	0	30	386	742	409	20	0	0	0	1,588	
	PK	0.0	0.0	0.0	0.0	1.5	8.5	9.2	8.5	5.6	0.0	0.0	0.0	9.2	
1	EQ5001		CHILLED WATER PUMP C.V.												
	ELEC	0	0	0	0	403	1700	1805	1573	239	0	0	0	5,720	
	PK	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	7.5	0.0	0.0	0.0	7.5	
1	EQ5313		CONTROLS												
	ELEC	0	0	0	0	16	68	73	63	10	0	0	0	230	
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3	
1	EQ4372		UNIT VENTILATOR FAN												
	ELEC	1266	1127	1276	1175	1271	1228	1217	1276	1175	1271	1260	1217	14,760	
	PK	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	
2	EQ4003		FC CENTRIF. FAN C.V.												

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING

	ELEC	363	316	320	324	342	311	355	320	324	342	385	355	4,056
	PK	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1	EQ2001	GAS FIRE TUBE HOT WATER												
	GAS	2082	1874	1408	448	0	0	0	0	0	451	1220	1826	9,308
	PK	17.1	17.1	16.5	11.1	0.0	0.0	0.0	0.0	0.0	11.1	13.6	17.1	17.1
1	EQ5020	HEAT WATER CIRC. PUMP C.V.												
	ELEC	3087	2871	2163	1417	0	0	0	0	0	1409	1939	2707	15,593
	PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1	EQ5240	BOILER FORCED DRAFT FAN												
	ELEC	747	695	523	343	0	0	0	0	0	341	469	655	3,774
	PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1	EQ5307	BOILER CONTROLS												
	ELEC	267	192	145	95	0	0	0	0	0	94	130	182	1,046
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
BASE BUILDING

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility   ELECTRIC DEMAND

Peak Value      115.9    (kW)  
Yearly Time of Peak 12 (hr)   7 (mo)

Hour 12   Month   7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ11021	AIR-CLD RECIP >55 TONS	90.2	77.83
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Sub Total			90.2	77.83
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	9.7	8.35
2		SUMMATION OF FAN ELECTRICAL DEMAND	4.3	3.73

Sub Total			14.0	12.08
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Sub Total			0.0	0.00
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Miscellaneous

Lights			11.7	10.09
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			11.7	10.09

Grand Total			115.9	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 452

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:15:26 2/ 3/94  
Dataset Name: CB452 .TM

AIRFLOW - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1 UV		4,113	28,144	28,144	31,236	7,204	0	0
2 SZ		3,081	15,404	15,404	16,816	15,404	0	0
3 UH		0	0	2,023	0	0	0	0
Totals		7,193	43,548	45,572	48,052	22,608	0	0

CAPACITY - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling					Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Sys. Opt. Capacity (Tons)	Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1 UV		66.6	0.0	0.0	0.0	66.6	-1,005,478	0	0	0	0	0	-1,005,478
2 SZ		28.2	0.0	0.0	0.0	28.2	-407,437	0	0	0	0	0	-407,437
3 UH		0.0	0.0	0.0	0.0	0.0	-125,512	0	0	0	0	0	-125,512
Totals		94.8	0.0	0.0	0.0	94.8	-1,538,428	0	0	0	0	0	-1,538,428

The building peaked at hour 16 month 7 with a capacity of 93.5 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	UV	14.61	2.00	422.5	211.3	56.80	2.00	-71.44	14,074
2	Main	SZ	20.00	3.12	546.6	175.1	68.53	3.12	-82.56	4,935
3	Main	UH	0.00	0.00	0.0	0.0	0.00	0.56	-34.93	3,593



System 1 Block UV - UNIT VENTILATOR

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	33,525	19,798		53,323	6.67	*	32,475	6.22	*	-28,011	-43,858	4.53
Glass Solar	194,827	0		194,827	24.37	*	207,644	39.80	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.48	*	26,528	5.08	*	-133,751	-133,751	13.80
Wall Cond	140,644	24,330		164,974	20.64	*	139,790	26.79	*	-490,481	-575,591	59.40
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.05
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	118,730			118,730	14.85	*	49,380	9.46	*	-215,310	-215,310	22.22
Sub Total==>	515,683	44,128		559,811	70.03	*	455,992	87.40	*	-868,008	-968,965	100.00
Internal Loads												
Lights	36,613	0		36,613	4.58	*	36,177	6.93	*	0	0	0.00
People	49,413			49,413	6.18	*	23,518	4.51	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	86,025	0	0	86,025	10.76	*	59,695	11.44	*	0	0	0.00
Ceiling Load	6,331	-6,331		0	0.00	*	6,036	1.16	*	-10,932	0	0.00
Outside Air	0	0	0	157,948	19.76	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,004	0.75	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-10,449	0	-10,449	-1.31	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	608,040	27,348	0	799,340	100.00	*	521,724	100.00	*	-878,939	-968,965	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	66.6	799.3	618.6	28,144 79.3 64.9 71.1	57.9 55.6 63.9	14,074		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	Part	350	
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	66.6	799.3				Roof	15,978	0 0
						Wall	12,830	3,646 28

-----AREAS-----

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	14.6	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F				Clg Cfm/Sqft	2.00	SADB	58.0	96.7
Main Htg	-1,005.5	28,144	63.9	96.7	Vent	4,113	0	Clg Cfm/Ton	422.51	Plenum	77.3	60.0
Aux Htg	0.0	0	0.0	0.0	Infil	3,091	3,091	Clg Sqft/Ton	211.28	Return	77.3	64.2
Preheat	-0.0	28,144	61.9	57.8	Supply	28,144	28,144	Clg Btuh/Sqft	56.80	Ret/OA	79.3	64.2
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	No. People	198	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Return	28,144	28,144	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	4,113	0	Htg Cfm/Sqft	2.00	Fn BldTD	0.0	0.0
Total	-1,005.5				Rm Exh	0	0	Htg Btuh/Sqft	-71.44	Fn Frict	0.1	0.0
					Auxil	0	0					

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/12 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WS/HR: 87/ 72/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct	Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot	Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)	(Btuh)	(Btuh)	(%)
Envelope Loads											
Skylite Solr	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Roof Cond	21,096	0	0	21,096	6.24	*	32,475	13.07	-28,011	-28,011	6.87
Glass Solar	75,357	0	0	75,357	22.28	*	117,002	47.09	0	0	0.00
Glass Cond	10,550	0	0	10,550	3.12	*	14,326	5.77	-72,739	-72,739	17.85
Wall Cond	54,890	0	0	54,890	16.23	*	62,360	25.10	-207,867	-207,867	51.02
Partition	175	0	0	175	0.05	*	175	0.07	-455	-455	0.11
Exposed Floor	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Infiltration	48,556	0	0	48,556	14.36	*	21,825	8.78	-98,365	-98,365	24.14
Sub Total==>	210,623	0	0	210,623	62.28	*	248,162	99.87	-407,437	-407,437	100.00
Internal Loads											
Lights	4,548	0	0	4,548	1.34	*	168	0.07	0	0	0.00
People	10,542	0	0	10,542	3.12	*	154	0.06	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.46	*	322	0.13	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Outside Air	0	0	0	105,913	31.32	*	0	0.00	0	0	0.00
Sup. Fan Heat	0	0	0	6,572	1.94	*	0	0.00	0	0	0.00
Ret. Fan Heat	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Duct Heat Pkup	0	0	0	0	0.00	*	0	0.00	0	0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Terminal Bypass	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Grand Total==>	225,713	0	0	338,198	100.00	*	248,485	100.00	-407,437	-407,437	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WS/HR	Leaving DB/WS/HR	Gross Total	Glass (sf)	(%)
	(Tops)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	28.2	338.2	234.4	77.4 64.5 72.8	59.8 57.5 68.8	4,935		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	350		
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	28.2	338.2				5,356	0	0
						5,231	1,983	38

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	20.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F								
Main Htg	-407.4	15,404	68.0	92.3	Vent	3,081	0	Clg Cfm/Sqft	3.12	SADB	60.2	92.3
Aux Htg	0.0	0	0.0	0.0	Infil	1,412	1,412	Clg Cfm/Ton	546.56	Plenum	75.0	68.0
Preheat	-0.0	15,404	68.0	59.8	Supply	15,404	15,404	Clg Sqft/Ton	175.10	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	68.53	Ret/OA	77.4	68.0
Humidif	0.0	0	0.0	0.0	Return	15,404	15,404	No. People	70	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	3,081	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Total	-407.4				Rm Exh	0	0	Htg Cfm/Sqft	3.12	Fn BldTD	0.1	0.0
					Auxil	0	0	Htg Btuh/Sqft	-82.56	Fn Frict	0.2	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-6,183	4.93
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-119,329	95.07
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-125,512	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-23,112	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-125,512	-125,512	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	3,593	0 0
Totals	0.0	0.0				Wall	2,000	0 0

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F				Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Main Htg	-125.5	2,023	68.0	125.0	Vent	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	46.3
Aux Htg	0.0	0	0.0	0.0	Supply	0	2,023	Clg Sqft/Ton	0.00	Return	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	2,023	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	0.56	Fn BldTD	0.0	0.0
Total	-125.5				Auxil	0	0	Htg Btuh/Sqft	-34.93	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	84.0	18.30
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	76.5	16.69
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	76.9	16.63
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	78.7	17.12
4	NAVE	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
5	CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	82.3	18.08
6	CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	85.6	18.75
7	VESTIBULE	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	63.1	14.15
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	83.2	18.28
System 1	Total/Ave.	0.100	0.000	0.000	0.000	0.045	0.560	0.573	1.000	0.297	79.7	17.43
4	NAVE	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
System 2	Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07
Building		0.100	0.000	0.000	0.000	0.052	0.560	0.573	1.000	0.297	78.4	17.18

BUILDING AREAS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.				6,037	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	0	198	192	80	48
Zone	3 Total/Ave.				3,102	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.				14,074	350	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
Building					22,602	700	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.052 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.420 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 3.35 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 49.04 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	4.7	23	211	-76,921	48	1,201	2,278.6	53	3,372	0.0	0	0
5 - 10	9.5	24	227	-153,843	7	181	4,557.2	0	0	0.0	0	0
10 - 15	14.2	15	142	-230,764	6	138	6,835.7	0	0	0.0	0	0
15 - 20	19.0	7	63	-307,686	6	155	9,114.3	14	856	0.0	0	0
20 - 25	23.7	12	113	-384,607	1	36	11,392.9	18	1,160	0.0	0	0
25 - 30	28.4	6	52	-461,528	1	20	13,671.5	0	0	0.0	0	0
30 - 35	33.2	0	4	-538,450	16	396	15,950.1	0	0	0.0	0	0
35 - 40	37.9	0	0	-615,371	0	0	18,228.6	0	0	0.0	0	0
40 - 45	42.7	0	0	-692,293	0	0	20,507.2	0	0	0.0	0	0
45 - 50	47.4	0	0	-769,214	0	0	22,785.8	0	0	0.0	0	0
50 - 55	52.1	0	0	-846,136	2	47	25,064.4	0	0	0.0	0	0
55 - 60	56.9	0	0	-923,057	6	154	27,343.0	0	0	0.0	0	0
60 - 65	61.6	5	45	-999,978	2	42	29,621.6	0	0	0.0	0	0
65 - 70	66.4	4	37	-1,076,900	1	17	31,900.1	3	168	0.0	0	0
70 - 75	71.1	2	20	-1,153,821	0	4	34,178.7	4	266	0.0	0	0
75 - 80	75.8	2	15	-1,230,743	2	38	36,457.3	0	0	0.0	0	0
80 - 85	80.6	0	0	-1,307,664	1	20	38,735.9	3	214	0.0	0	0
85 - 90	85.3	1	5	-1,384,585	2	53	41,014.5	5	290	0.0	0	0
90 - 95	90.1	0	0	-1,461,507	0	0	43,293.0	0	0	0.0	0	0
95 - 100	94.8	0	0	-1,538,428	0	0	45,571.6	0	0	0.0	0	0
Hours Off	0.0	0	7,826	0	0	6,258	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----				
Range (F)	1	2	3	2	4
Max. Temp.	88.4	96.8	98.6	96.9	89.5
Mo./Hr.	7 22	7 23	7 23	7 22	7 24
Day Type	4	1	1	1	1
	..... Number of Hours .....				
Above 100	0	0	0	0	0
95 - 100	0	30	408	30	0
90 - 95	0	456	1,232	402	0
85 - 90	319	984	828	955	972
80 - 85	1,292	1,381	779	1,384	1,316
75 - 80	2,061	786	476	871	1,001
70 - 75	133	184	357	179	383
65 - 70	1,942	1,444	544	1,452	1,939
60 - 65	1,297	951	902	947	1,473
55 - 60	549	621	574	634	712
50 - 55	471	876	976	879	964
Below 50	696	1,047	1,684	1,027	0
Min. Temp.	37.0	38.9	37.4	38.9	54.9
Mo./Hr.	2 7	2 6	2 13	2 6	2 8
Day Type	5	4	4	4	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	GAS	GAS DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	8,644	36	1,977	16
Feb	7,860	36	1,783	16
March	7,420	36	1,334	16
April	5,988	36	364	11
May	5,853	55	0	0
June	10,606	103	0	0
July	13,059	119	0	0
Aug	10,941	103	0	0
Sept	5,353	90	0	0
Oct	6,167	36	333	11
Nov	7,040	36	1,142	13
Dec	7,783	36	1,744	16
Total	96,714	119	8,677	16

Building Energy Consumption = 52,993 (Btu/Sq Ft/Year)  
Source Energy Consumption = 84,226 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)



[illegible]

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2  
WALL & ROOF INSULATION

	ELEC	332	289	293	297	313	285	324	293	297	313	352	324	3,710
	PK	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
1	EQ2001	GAS FIRE TUBE HOT WATER												
	GAS	1977	1783	1334	364	0	0	0	0	0	333	1142	1744	8,677
	PK	16.0	16.0	15.7	10.6	0.0	0.0	0.0	0.0	0.0	10.5	13.5	16.0	16.0
1	EQ5020	HEAT WATER CIRC. PUMP C.V.												
	ELEC	3177	2946	2163	1380	0	0	0	0	0	1245	1991	2655	15,555
	PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1	EQ5240	BOILER FORCED DRAFT FAN												
	ELEC	769	713	523	334	0	0	0	0	0	301	482	643	3,765
	PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1	EQ5307	BOILER CONTROLS												
	ELEC	213	198	145	93	0	0	0	0	0	84	133	178	1,043
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        118.9    (kW)  
Yearly Time of Peak 11 (hr)    7 (mo)

Hour 11    Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	92.9	78.10
Sub Total			92.9	78.10
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		8.6	7.20
2	SUMMATION OF FAN ELECTRICAL DEMAND		4.0	3.33
Sub Total			12.5	10.53
Sub Total			0.0	0.00

Miscellaneous

Lights	13.5	11.37
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	13.5	11.37

Grand Total	118.9	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 452

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Reflectance: 0.20  
Winter Ground Reflectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4.790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 12:47: 6 2/ 3/94  
Dataset Name: CB452 .TM

AIRFLOW - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- SYSTEM SUMMARY -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	UV	4,656	31,762	31,762	34,624	7,518	0	0
2	SZ	3,431	17,156	17,156	18,463	17,156	0	0
3	UH	0	0	2,078	0	0	0	0
Totals		8,087	48,918	50,995	53,088	24,674	0	0

CAPACITY - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- SYSTEM SUMMARY -----  
(Design Capacity Quantities)

		Cooling					Heating					
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
System	System	Capacity	Capacity	Capacity	Totals	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Totals
Number	Type	(Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)
1	UV	71.4	0.0	0.0	71.4	-1,038,363	0	0	0	0	0	-1,038,363
2	SZ	28.7	0.0	0.0	28.7	-410,637	0	0	0	0	0	-410,637
3	UH	0.0	0.0	0.0	0.0	-128,877	0	0	0	0	0	-128,877
Totals		100.1	0.0	0.0	100.1	-1,577,877	0	0	0	0	0	-1,577,877

The building peaked at hour 16 month 7 with a capacity of 99.6 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	UV	14.66	2.26	444.8	197.1	60.88	2.26	-73.78	14,074
2	Main	SZ	20.00	3.48	597.1	171.8	69.86	3.48	-83.21	4,935
3	Main	UH	0.00	0.00	0.0	0.0	0.00	0.58	-35.87	3,593

System 1 Block UV - UNIT VENTILATOR

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,251		90,507	10.56	*	44,331	8.02	*	-38,497	-71,735	7.33
Glass Solar	195,227	0		195,227	22.78	*	212,025	38.37	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.24	*	26,479	4.79	*	-133,751	-133,751	13.66
Wall Cond	154,963	25,463		180,426	21.06	*	165,455	29.94	*	-490,481	-573,762	58.60
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.05
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	109,935			109,935	12.83	*	44,751	8.10	*	-199,361	-199,361	20.36
Sub Total==>	534,338	69,714		604,052	70.50	*	493,217	89.25	*	-862,545	-979,064	100.00
Internal Loads												
Lights	36,835	0		36,835	4.30	*	30,432	5.51	*	0	0	0.00
People	49,545			49,545	5.78	*	20,293	3.67	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	86,379	0	0	86,379	10.08	*	50,724	9.18	*	0	0	0.00
Ceiling Load	10,260	-10,260		0	0.00	*	8,670	1.57	*	-11,842	0	0.00
Outside Air	0	0	0	178,807	20.87	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,776	0.79	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-19,169	0	-19,169	-2.24	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	630,978	40,285	0	856,845	100.00	*	552,612	100.00	*	-874,387	-979,064	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	71.4	856.8	31,762	80.6 65.3 71.1	58.9 56.5 66.3	Part	14,074	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	350	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	0	
Totals	71.4	856.8				Wall	15,978	0 0
							12,830	3,646 28

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	14.7	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F								
Main Htg	-1,038.4	31,762	63.3	93.3	Vent	4,656	0	Clg Cfm/Sqft	2.26	SADB	59.0	93.3
Aux Htg	0.0	0	0.0	0.0	Infil	2,862	2,862	Clg Cfm/Ton	444.82	Plenum	78.8	58.8
Preheat	-0.0	31,762	61.9	58.8	Supply	31,762	31,762	Clg Sqft/Ton	197.10	Return	78.8	63.6
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	60.88	Ret/OA	80.5	63.6
Humidif	0.0	0	0.0	0.0	Return	31,762	31,762	No. People	198	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	4,656	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-1,038.4				Rm Exh	0	0	Htg Cfm/Sqft	2.26	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-73.78	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/12 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 87/ 72/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	30,496	0		30,496	8.85	*	44,331	16.49	*	-38,497	-38,497	9.37
Glass Solar	75,357	0		75,357	21.86	*	117,002	43.53	*	0	0	0.00
Glass Cond	10,550	0		10,550	3.06	*	14,326	5.33	*	-72,739	-72,739	17.71
Wall Cond	42,873	0		42,873	12.43	*	72,429	26.95	*	-207,867	-207,867	50.62
Partition	175			175	0.05	*	175	0.07	*	-455	-455	0.11
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	44,959			44,959	13.04	*	20,208	7.52	*	-91,079	-91,079	22.18
Sub Total==>	204,410	0		204,410	59.29	*	268,470	99.88	*	-410,637	-410,637	100.00
Internal Loads												
Lights	4,548	0		4,548	1.32	*	168	0.06	*	0	0	0.00
People	10,542			10,542	3.06	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.38	*	322	0.12	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	117,958	34.21	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				7,320	2.12	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	219,500	0	0	344,778	100.00	*	268,793	100.00	*	-410,637	-410,637	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			AREAS		
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Gross Total	Glass (sf) (%)
Main Clg	28.7	344.8	235.7	17,156	77.4	64.5	72.8	60.2	58.1	70.8	Floor	4,935
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	350
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0
Totals	28.7	344.8									Roof	5,356
											Wall	5,231
												1,983 38

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	ENGINEERING CHECKS--			TEMPERATURES (F)---		
	(Mbh)	(cfm)	Deg F	Deg F				Clg % OA	20.0		Type	Clg	Htg
Main Htg	-410.6	17,156	68.0	90.0	Vent	3,431	0	Clg Cfm/Sqft	3.48		SADB	60.6	90.0
Aux Htg	0.0	0	0.0	0.0	Infil	1,308	1,308	Clg Cfm/Ton	597.10		Plenum	75.0	68.0
Preheat	-0.0	17,156	68.0	60.2	Supply	17,156	17,156	Clg Sqft/Ton	171.76		Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	69.86		Ret/OA	77.4	68.0
Humidif	0.0	0	0.0	0.0	Return	17,156	17,156	No. People	70		Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	3,431	0	Htg % OA	0.0		Fn MtrTD	0.1	0.0
Total	-410.6				Rm Exh	0	0	Htg Cfm/Sqft	3.48		Fn BldTD	0.1	0.0
					Auxil	0	0	Htg Btuh/Sqft	-83.21		Fn Frict	0.2	0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-10,810	8.39
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-118,067	91.61
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-128,877	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-26,477	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat PkUp		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf) (%)	
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	3,593	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	3,593	0 0
Totals	0.0	0.0								Wall	2,000	0 0

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	AIRFLOWS (cfm)		--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F		Cooling	Heating	Clg % OA		Type	Clg	Htg
Main Htg	-128.9	2,078	68.0	125.0	Vent	0	0	Clg % OA	0.0	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	0	Clg Cfm/Sqft	0.00	Plenum	0.0	43.2
Preheat	0.0	0	0.0	0.0	Supply	0	2,078	Clg Cfm/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	2,078	Clg Btuh/Sqft	0.00	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Fn MtrTD	0.0	0.0
Total	-128.9				Rm Exh	0	0	Htg % OA	0.0	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Cfm/Sqft	0.58	Fn Frict	0.0	0.0
								Htg Btuh/Sqft	-35.87			



BUILDING U-VALUES - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G U - V A L U E S -----

		Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
Room Number	Description	Part.	ExFlr	Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Windo	Wall	Ceil.		
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2	17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9	16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4	16.14
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1	16.60
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
5	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3	17.49
6	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5	18.15
7	VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7	13.66
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3	17.69
System 1	Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3	16.95
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
System 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5	16.46

BUILDING AREAS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.				6,037	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	0	198	192	80	48
Zone	3 Total/Ave.				3,102	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.				14,074	350	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
Building					22,602	700	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.0	13	107	-78,894	49	1,268	2,549.8	53	3,372	0.0	0	0
5 - 10	10.0	31	263	-157,788	9	239	5,099.5	0	0	0.0	0	0
10 - 15	15.0	15	130	-236,682	5	134	7,649.3	0	0	0.0	0	0
15 - 20	20.0	12	102	-315,575	5	133	10,199.1	14	956	0.0	0	0
20 - 25	25.0	11	94	-394,469	1	29	12,748.8	18	1,160	0.0	0	0
25 - 30	30.0	4	38	-473,363	1	38	15,298.6	0	0	0.0	0	0
30 - 35	35.0	0	0	-552,257	15	388	17,848.3	0	0	0.0	0	0
35 - 40	40.1	0	0	-631,151	0	0	20,398.1	0	0	0.0	0	0
40 - 45	45.1	0	0	-710,045	0	0	22,947.9	0	0	0.0	0	0
45 - 50	50.1	0	0	-788,939	0	0	25,497.6	0	0	0.0	0	0
50 - 55	55.1	2	19	-867,832	3	83	28,047.4	0	0	0.0	0	0
55 - 60	60.1	2	18	-946,726	5	118	30,597.2	0	0	0.0	0	0
60 - 65	65.1	5	45	-1,025,620	2	42	33,146.9	0	0	0.0	0	0
65 - 70	70.1	4	35	-1,104,514	1	17	35,696.7	3	168	0.0	0	0
70 - 75	75.1	1	5	-1,183,408	0	8	38,246.5	4	266	0.0	0	0
75 - 80	80.1	0	0	-1,262,302	2	50	40,796.2	0	0	0.0	0	0
80 - 85	85.1	0	0	-1,341,195	1	37	43,346.0	0	0	0.0	0	0
85 - 90	90.1	0	0	-1,420,089	1	20	45,895.8	8	504	0.0	0	0
90 - 95	95.1	0	0	-1,498,983	0	0	48,445.5	0	0	0.0	0	0
95 - 100	100.1	0	0	-1,577,877	0	0	50,995.3	0	0	0.0	0	0
Hours Off	0.0	0	7,904	0	0	6,156	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----					
Temperature Range (F)	----- Zone Number -----				
	1	2	3	2	4
Max. Temp.	89.3	98.2	99.9	98.4	91.3
Mo./Hr.	7 23	7 23	7 24	7 23	7 24
Day Type	4	1	1	1	1
..... Number of Hours .....					
Above 100	0	0	0	0	0
95 - 100	0	45	456	45	0
90 - 95	0	542	1,188	473	90
85 - 90	405	1,074	776	1,065	971
80 - 85	1,301	1,278	834	1,252	1,243
75 - 80	1,947	695	486	804	1,013
70 - 75	201	203	360	198	355
65 - 70	2,034	1,487	553	1,503	1,963
60 - 65	1,167	937	876	925	1,334
55 - 60	530	612	643	611	752
50 - 55	458	858	714	875	1,039
Below 50	717	1,029	1,874	1,009	0
Min. Temp.	37.1	39.1	36.9	39.1	54.9
Mo./Hr.	2 7	2 12	2 12	2 12	1 7
Day Type	5	3	4	3	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	GAS	GAS DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	8,751	38	2,001	16
Feb	7,962	38	1,797	16
March	7,646	38	1,336	16
April	6,089	38	380	10
May	6,248	57	11	1
June	10,653	105	0	0
July	13,211	114	0	0
Aug	10,882	105	0	0
Sept	5,340	88	0	0
Oct	6,442	38	389	11
Nov	7,195	38	1,164	13
Dec	8,067	38	1,761	16
Total	98,487	114	8,839	16

Building Energy Consumption = 53,980 (Btu/Sq Ft/Year)  
Source Energy Consumption = 85,787 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	3056	2740	3195	2868	3126	3066	2928	3195	2868	3126	2987	2928	36,082
	PK	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTW20	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1122L	AIR-CLD RECIP >55 TONS												
	ELEC	0	0	0	0	692	3810	6071	3847	416	0	0	0	14,837
	PK	0.0	0.0	0.0	0.0	22.8	63.4	71.7	63.2	46.3	0.0	0.0	0.0	71.7
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	60	414	738	436	37	0	0	0	1,685
	PK	0.0	0.0	0.0	0.0	1.5	8.3	9.0	8.3	6.5	0.0	0.0	0.0	9.0
1	EQ5001	CHILLED WATER PUMP C.V.												
	ELEC	0	0	0	0	537	1730	1805	1715	477	0	0	0	6,264
	PK	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	7.5	0.0	0.0	0.0	7.5
1	EQ5313	CONTROLS												
	ELEC	0	0	0	0	22	70	73	69	19	0	0	0	252
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4372	UNIT VENTILATOR FAN												
	ELEC	1284	1143	1294	1191	1289	1245	1235	1294	1191	1289	1278	1235	14,969
	PK	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
2	EQ4003	FC CENTRIF. FAN C.V.												

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

	ELEC	370	322	326	330	348	317	361	326	330	348	392	361	4,132
	PK	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4
1	EQ2001	GAS FIRE TUBE HOT WATER												
	GAS	2001	1797	1336	380	11	0	0	0	0	389	1164	1761	8,839
	PK	16.3	16.3	15.8	10.5	0.6	0.0	0.0	0.0	0.0	10.5	13.3	16.3	16.3
1	EQ5020	HEAT WATER CIRC. PUMP C.V.												
	ELEC	3087	2871	2163	1298	134	0	0	0	0	1283	1939	2707	15,481
	PK	7.5	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1	EQ5240	BOILER FORCED DRAFT FAN												
	ELEC	747	695	523	314	32	0	0	0	0	310	469	655	3,747
	PK	1.8	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1	EQ5307	BOILER CONTROLS												
	ELEC	207	192	145	87	9	0	0	0	0	86	130	182	1,038
	PK	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
WEATHERSTRIP & CAULKING

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 114.5 (kW)  
Yearly Time of Peak 12 (hr) 7 (mo)

Hour 12 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	88.5	77.34
Sub Total			88.5	77.34
Sub Total			0.0	0.00

Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		9.8	8.59
2	SUMMATION OF FAN ELECTRICAL DEMAND		4.4	3.85
Sub Total			14.2	12.44
Sub Total			0.0	0.00

Miscellaneous

Lights	11.7	10.22
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	11.7	10.22

Grand Total	114.5	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 452

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13:18:43 2/ 3/94  
Dataset Name: CB452 .TM

AIRFLOW - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	UV	4,569	31,185	31,185	34,735	8,119	0	0
2	SZ	3,368	16,839	16,839	18,461	16,839	0	0
3	UH	0	0	2,078	0	0	0	0
Totals		7,937	48,025	50,102	53,196	24,958	0	0

CAPACITY - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	UV	73.2	0.0	0.0	73.2	-1,079,304	0	0	0	0	0	-1,079,304
2	SZ	29.4	0.0	0.0	29.4	-432,496	0	0	0	0	0	-432,496
3	UH	0.0	0.0	0.0	0.0	-128,877	0	0	0	0	0	-128,877
Totals		102.6	0.0	0.0	102.6	-1,640,677	0	0	0	0	0	-1,640,677

The building peaked at hour 16 month 7 with a capacity of 102.0 tons

ENGINEERING CHECKS - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	UV	14.65	2.22	426.3	192.4	62.37	2.22	-76.69	14,074
2	Main	SZ	20.00	3.41	572.0	167.6	71.58	3.41	-87.64	4,935
3	Main	UH	0.00	0.00	0.0	0.0	0.00	0.58	-35.87	3,593

System 1 Block UV - UNIT VENTILATOR

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,263		90,519	10.31	*	44,331	7.90	*	-38,497	-71,866	7.00
Glass Solar	195,227	0		195,227	22.24	*	212,025	37.76	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.16	*	26,479	4.72	*	-133,751	-133,751	13.02
Wall Cond	154,963	25,493		180,456	20.56	*	165,455	29.47	*	-490,481	-574,097	55.88
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.04
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	136,320			136,320	15.53	*	55,492	9.88	*	-247,207	-247,207	24.06
Sub Total==>	560,723	69,756		630,478	71.82	*	503,957	89.76	*	-910,391	-1,027,376	100.00
Internal Loads						*			*			
Lights	34,390	0		34,390	3.92	*	28,414	5.06	*	0	0	0.00
People	49,545			49,545	5.64	*	20,293	3.61	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	83,935	0	0	83,935	9.56	*	48,707	8.67	*	0	0	0.00
Ceiling Load	10,206	-10,206		0	0.00	*	8,804	1.57	*	-12,031	0	0.00
Outside Air	0	0	0	175,474	19.99	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,653	0.76	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat PkUp		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-18,711	0	-18,711	-2.13	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	654,863	40,839	0	877,829	100.00	*	561,468	100.00	*	-922,422	-1,027,376	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			AREAS		
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	73.2	877.8	31,185	80.6	65.3	71.1	58.3	56.1	65.4	Floor	14,074	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	350	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Totals	73.2	877.8								Roof	15,978	0 0
										Wall	12,830	3,646 28

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	--ENGINEERING CHECKS--			--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F				Clg % OA	14.7	Type	Clg	Htg	
Main Htg	-1,079.3	31,185	63.4	95.2	Vent	4,569	0	Clg Cfm/Sqft	2.22	SAD8	58.5	95.2	
Aux Htg	0.0	0	0.0	0.0	Infil	3,550	3,550	Clg Cfm/Ton	426.31	Plenum	78.8	59.0	
Preheat	-0.0	31,185	62.0	58.3	Supply	31,185	31,185	Clg Sqft/Ton	192.39	Return	78.8	63.7	
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	62.37	Ret/OA	80.5	63.7	
Humidif	0.0	0	0.0	0.0	Return	31,185	31,185	No. People	198	Runarnd	75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Exhaust	4,569	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0	
Total	-1,079.3				Rm Exh	0	0	Htg Cfm/Sqft	2.22	Fn BldTD	0.0	0.0	
					Auxil	0	0	Htg Btuh/Sqft	-76.69	Fn Frict	0.1	0.0	

System 2 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/12 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 87/ 72/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct	Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot	Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)	(Btuh)	(Btuh)	(%)
Envelope Loads											
Skylite Solr	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Roof Cond	30,496	0	0	30,496	8.63	*	44,331	16.20	-38,497	-38,497	8.90
Glass Solar	75,357	0	0	75,357	21.33	*	117,002	42.76	0	0	0.00
Glass Cond	10,550	0	0	10,550	2.99	*	14,326	5.24	-72,739	-72,739	16.82
Wall Cond	42,873	0	0	42,873	12.14	*	72,429	26.47	-207,867	-207,867	48.06
Partition	175	0	0	175	0.05	*	175	0.06	-455	-455	0.11
Exposed Floor	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Infiltration	55,749	0	0	55,749	15.78	*	25,058	9.16	-112,938	-112,938	26.11
Sub Total==>	215,200	0	0	215,200	60.92	*	273,320	99.88	-432,496	-432,496	100.00
Internal Loads											
Lights	4,548	0	0	4,548	1.29	*	168	0.06	0	0	0.00
People	10,542	0	0	10,542	2.98	*	154	0.06	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.27	*	322	0.12	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Outside Air	0	0	0	115,783	32.78	*	0	0.00	0	0	0.00
Sup. Fan Heat	0	0	0	7,185	2.03	*	0	0.00	0	0	0.00
Ret. Fan Heat	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Duct Heat PkUp	0	0	0	0	0.00	*	0	0.00	0	0	0.00
OY/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Terminal Bypass	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Grand Total==>	230,290	0	0	353,258	100.00	*	273,643	100.00	-432,496	-432,496	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	29.4	353.3	238.8	77.4 64.5 72.8	59.7 57.8 70.3	4,935		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	350		
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	29.4	353.3				5,356	0	0
						5,231	1,983	38

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	20.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F				Clg Cfm/Sqft		SADB	60.1	91.6
Main Htg	-432.5	16,839	68.0	91.6	Infil	1,622	1,622	Clg Cfm/Ton	572.02	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	16,839	16,839	Clg Sqft/Ton	167.64	Return	75.0	68.0
Preheat	-0.0	16,839	68.0	59.7	Mincfm	0	0	Clg Btuh/Sqft	71.58	Ret/OA	77.4	68.0
Reheat	0.0	0	0.0	0.0	Return	16,839	16,839	No. People	70	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	3,368	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	3.41	Fn BldTD	0.1	0.0
Total	-432.5				Auxil	0	0	Htg Btuh/Sqft	-87.64	Fn Frict	0.2	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-10,810	8.39
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-118,067	91.61
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-128,877	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-26,477	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	AREAS	
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	3,593	0 0
Totals	0.0	0.0								Wall	2,000	0 0

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	AIRFLOWS (cfm)		--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
	(Mbh)	(cfm)	Deg F	Deg F	Vent	Cooling	Heating	Clg % OA		Type	Clg	Htg
Main Htg	-128.9	2,078	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	2,078	Clg Cfm/Ton	0.00	Plenum	0.0	43.2
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	2,078	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-128.9				Auxil	0	0	Htg Cfm/Sqft	0.58	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-35.87	Fn Frict	0.0	0.0

BUILDING U-VALUES - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Summr Roof	Wintr Windo	Wintr Windo	Wall	Ceil.		
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2	17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9	16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4	16.14
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1	16.60
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
5	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3	17.49
6	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5	18.15
7	VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7	13.66
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3	17.69
System 1	Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3	16.95
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
System 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5	16.46

BUILDING AREAS - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- B U I L D I N G   A R E A S -----

Room		Number of Duplicate	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
Number	Description	Flr	Rm									
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.				6,037	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	198	192	80	48
Zone	3 Total/Ave.				3,102	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.				14,074	350	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.				4,935	350	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.				3,593	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.				3,593	0	0	0	3,593	0	0	2,000
Building					22,602	700	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.1	18	144	-82,034	47	1,234	2,505.1	53	3,372	0.0	0	0
5 - 10	10.3	29	240	-164,068	10	251	5,010.2	0	0	0.0	0	0
10 - 15	15.4	17	137	-246,102	6	149	7,515.4	0	0	0.0	0	0
15 - 20	20.5	6	51	-328,135	5	141	10,020.5	14	856	0.0	0	0
20 - 25	25.6	11	86	-410,169	1	26	12,525.6	18	1,160	0.0	0	0
25 - 30	30.8	5	38	-492,203	1	14	15,030.7	0	0	0.0	0	0
30 - 35	35.9	0	0	-574,237	15	379	17,535.8	0	0	0.0	0	0
35 - 40	41.0	0	0	-656,271	1	33	20,041.0	0	0	0.0	0	0
40 - 45	46.2	5	37	-738,305	0	0	22,546.1	0	0	0.0	0	0
45 - 50	51.3	0	0	-820,339	0	0	25,051.2	0	0	0.0	0	0
50 - 55	56.4	0	0	-902,372	2	47	27,556.3	0	0	0.0	0	0
55 - 60	61.6	1	8	-984,406	6	154	30,061.5	0	0	0.0	0	0
60 - 65	66.7	5	37	-1,066,440	2	42	32,566.6	0	0	0.0	0	0
65 - 70	71.8	5	40	-1,148,474	1	21	35,071.7	3	168	0.0	0	0
70 - 75	76.9	0	0	-1,230,508	0	4	37,576.8	4	266	0.0	0	0
75 - 80	82.1	0	0	-1,312,542	2	50	40,081.9	0	0	0.0	0	0
80 - 85	87.2	0	0	-1,394,576	1	37	42,587.1	0	0	0.0	0	0
85 - 90	92.3	0	0	-1,476,609	1	20	45,092.2	8	504	0.0	0	0
90 - 95	97.5	0	0	-1,558,643	0	0	47,597.3	0	0	0.0	0	0
95 - 100	102.6	0	0	-1,640,677	0	0	50,102.4	0	0	0.0	0	0
Hours Off	0.0	0	7,942	0	0	6,158	0.0	0	2,434	0.0	0	8,760



BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4  
 REPLACE FLUORESCENT LAMPS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----					
Temperature Range (F)	Zone Number -----				
	1	2	3	2	4
Max. Temp.	89.0	97.8	99.3	98.0	91.3
Mo./Hr.	7 24	7 23	7 24	7 23	7 24
Day Type	4	1	1	1	1
..... Number of Hours .....					
Above 100	0	0	0	0	0
95 - 100	0	45	372	45	0
90 - 95	0	479	1,156	390	90
85 - 90	363	1,059	688	1,038	971
80 - 85	1,318	1,278	970	1,250	1,243
75 - 80	1,895	731	537	853	1,013
70 - 75	245	229	306	225	355
65 - 70	1,984	1,419	557	1,425	1,963
60 - 65	1,201	956	940	954	1,334
55 - 60	538	557	525	572	752
50 - 55	462	892	793	875	1,039
Below 50	754	1,113	1,316	1,113	0
Min. Temp.	36.6	38.4	38.5	38.5	54.9
Mo./Hr.	2 7	2 12	2 13	2 11	1 7
Day Type	5	3	4	3	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	GAS On Peak (Therm)	GAS DMND On Peak (Thrm/hr)
Jan	8,547	36	2,085	17
Feb	7,778	36	1,877	17
March	7,426	36	1,413	17
April	6,052	36	451	11
May	5,350	55	0	0
June	10,124	106	0	0
July	13,009	115	0	0
Aug	10,241	106	0	0
Sept	4,665	80	0	0
Oct	6,395	36	456	11
Nov	6,999	36	1,225	14
Dec	7,873	36	1,830	17
Total	94,458	115	9,336	17

Building Energy Consumption = 55,572 (Btu/Sq Ft/Year)  
Source Energy Consumption = 86,277 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	2383	2583	3005	2703	2944	2885	2763	3005	2703	2944	2822	2763	34,004
	PK	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6	12.6
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1122L	AIR-CLD RECIP >55 TONS												
	ELEC	0	0	0	0	352	3554	6064	3604	201	0	0	0	13,775
	PK	0.0	0.0	0.0	0.0	22.8	64.7	73.1	64.5	39.9	0.0	0.0	0.0	73.1
1	EQ5200	CONDENSER FANS												
	ELEC	0	0	0	0	28	383	738	406	19	0	0	0	1,574
	PK	0.0	0.0	0.0	0.0	1.5	8.5	9.2	8.5	5.6	0.0	0.0	0.0	9.2
1	EQ5001	CHILLED WATER PUMP C.V.												
	ELEC	0	0	0	0	403	1700	1805	1573	239	0	0	0	5,720
	PK	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5	7.5	0.0	0.0	0.0	7.5
1	EQ5313	CONTROLS												
	ELEC	0	0	0	0	16	68	73	63	10	0	0	0	230
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4372	UNIT VENTILATOR FAN												
	ELEC	1259	1121	1270	1169	1265	1222	1212	1270	1169	1265	1254	1212	14,687
	PK	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7	9.7
2	EQ4003	FC CENTRIF. FAN C.V.												

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

	ELEC	363	316	320	324	342	311	355	320	324	342	385	355	4,056
	PK	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1	EQ2001	GAS FIRE TUBE HOT WATER												
	GAS	2085	1877	1413	451	0	0	0	0	0	456	1225	1830	9,336
	PK	17.1	17.1	16.5	11.1	0.0	0.0	0.0	0.0	0.0	11.1	13.7	17.1	17.1
1	EQ5020	HEAT WATER CIRC. PUMP C.V.												
	ELEC	3087	2871	2163	1417	0	0	0	0	0	1409	1939	2707	15,593
	PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1	EQ5240	BOILER FORCED DRAFT FAN												
	ELEC	747	695	523	343	- 0	0	0	0	0	341	469	655	3,774
	PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1	EQ5307	BOILER CONTROLS												
	ELEC	207	192	145	95	0	0	0	0	0	94	130	182	1,046
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4  
REPLACE FLUORESCENT LAMPS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 115.3 (kW)  
Yearly Time of Peak 12 (hr) 7 (mo)

Hour 12 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	90.1	78.13
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Sub Total			90.1	78.13
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	9.7	8.37
2		SUMMATION OF FAN ELECTRICAL DEMAND	4.3	3.75

Sub Total			14.0	12.12
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Sub Total			0.0	0.00
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Miscellaneous

Lights			11.2	9.75
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			11.2	9.75

Grand Total			115.3	100.00
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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 452

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15: 3:40 2/ 3/94  
Dataset Name: CB452B .TM

AIRFLOW - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- SYSTEM SUMMARY -----  
(Design Airflow Quantities)

System Number	System Type	Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Main Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)	Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
1	UV	4,552	30,998	30,998	34,548	8,102	0	0
2	SZ	3,368	16,839	16,839	18,461	16,839	0	0
3	UH	0	0	2,078	0	0	0	0
Totals		7,920	47,837	49,915	53,009	24,941	0	0

CAPACITY - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- SYSTEM SUMMARY -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	UV	72.8	0.0	0.0	72.8	-1,077,553	0	0	0	0	0	-1,077,553
2	SZ	29.4	0.0	0.0	29.4	-432,496	0	0	0	0	0	-432,496
3	UH	0.0	0.0	0.0	0.0	-128,877	0	0	0	0	0	-128,877
Totals		102.2	0.0	0.0	102.2	-1,638,925	0	0	0	0	0	-1,638,925

The building peaked at hour 16 month 7 with a capacity of 101.6 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- ENGINEERING CHECKS -----

System Number	Main/Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/Sq Ft	Cfm/Ton	Sq Ft/Ton	Btuh/Sq Ft	Cfm/Sq Ft	Btuh/Sq Ft	
1	Main	UV	14.69	2.20	425.9	193.4	62.05	2.20	-76.56	14,074
2	Main	SZ	20.00	3.41	572.0	167.6	71.58	3.41	-87.64	4,935
3	Main	UH	0.00	0.00	0.0	0.0	0.00	0.58	-35.87	3,593

System 1 Block UV - UNIT VENTILATOR

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,241		90,497	10.36	*	44,331	7.94	*	-38,497	-71,863	6.99
Glass Solar	195,227	0		195,227	22.35	*	212,025	37.96	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.18	*	26,479	4.74	*	-133,751	-133,751	13.02
Wall Cond	154,963	25,447		180,410	20.66	*	165,455	29.63	*	-490,481	-574,090	55.88
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.04
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	136,320			136,320	15.61	*	55,492	9.94	*	-247,207	-247,207	24.06
Sub Total==>	560,723	69,688		630,411	72.19	*	503,957	90.24	*	-910,391	-1,027,366	100.00
Internal Loads												
Lights	30,724	0		30,724	3.52	*	25,388	4.55	*	0	0	0.00
People	49,545			49,545	5.67	*	20,293	3.63	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	80,268	0	0	80,268	9.19	*	45,681	8.18	*	0	0	0.00
Ceiling Load	10,301	-10,301		0	0.00	*	8,852	1.58	*	-12,094	0	0.00
Outside Air	0	0	0	174,838	20.02	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,613	0.76	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-18,818	0	-18,818	-2.15	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	651,292	40,570	0	873,313	100.00	*	558,489	100.00	*	-922,485	-1,027,366	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	72.8	873.3	673.2	30,998 80.6 65.3 71.1	58.3 56.1 65.5	14,074		
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Part 350		
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	ExFlr 0		
Totals	72.8	873.3				Roof 15,978	0	0
						Wall 12,830	3,646	28

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	14.7	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	4,552	0	Clg Cfm/Sqft	2.20	SADB	58.4	95.3
Main Htg	-1,077.6	30,998	63.4	95.3	Infil	3,550	3,550	Clg Cfm/Ton	425.94	Plenum	78.8	59.0
Aux Htg	0.0	0	0.0	0.0	Supply	30,998	30,998	Clg Sqft/Ton	193.39	Return	78.8	63.8
Preheat	-0.0	30,998	62.1	58.2	Mincfm	0	0	Clg Btuh/Sqft	62.05	Ret/OA	80.5	63.8
Reheat	0.0	0	0.0	0.0	Return	30,998	30,998	No. People	198	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	4,552	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	2.20	Fn BldTD	0.0	0.0
Total	-1,077.6				Auxil	0	0	Htg Btuh/Sqft	-76.56	Fn Frict	0.1	0.0



System 2 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/12 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 87/ 72/ 98.0 \* OADB: 89 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	30,496	0	0	30,496	8.63	*	44,331	16.20	*	-38,497	-38,497	8.90
Glass Solar	75,357	0	0	75,357	21.33	*	117,002	42.76	*	0	0	0.00
Glass Cond	10,550	0	0	10,550	2.99	*	14,326	5.24	*	-72,739	-72,739	16.82
Wall Cond	42,873	0	0	42,873	12.14	*	72,429	26.47	*	-207,867	-207,867	48.06
Partition	175	0	0	175	0.05	*	175	0.06	*	-455	-455	0.11
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	55,749	0	0	55,749	15.78	*	25,058	9.16	*	-112,938	-112,938	26.11
Sub Total==>	215,200	0	0	215,200	60.92	*	273,320	99.88	*	-432,496	-432,496	100.00
Internal Loads												
Lights	4,548	0	0	4,548	1.29	*	168	0.06	*	0	0	0.00
People	10,542	0	0	10,542	2.98	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.27	*	322	0.12	*	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	115,783	32.78	*	0	0.00	*	0	0	0.00
Sup. Fan Heat	0	0	0	7,185	2.03	*	0	0.00	*	0	0	0.00
Ret. Fan Heat	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Duct Heat Pkup	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Terminal Bypass	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Grand Total==>	230,290	0	0	353,258	100.00	*	273,643	100.00	*	-432,496	-432,496	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	AREAS Glass (sf) (%)
Main Clg	29.4	353.3	16,839	77.4 64.5 72.8	59.7 57.8 70.3	4,935	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	350	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0	
Totals	29.4	353.3				5,356	0 0
						5,231	1,983 38

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling 3,368	Heating 0	ENGINEERING CHECKS-- Clg % OA 20.0	TEMPERATURES (F)--- Type Clg Htg
Main Htg	-432.5	16,839	68.0	91.6	Vent	1,622	1,622	Clg Cfm/Sqft 3.41	SADB 60.1 91.6
Aux Htg	0.0	0	0.0	0.0	Infil	16,839	16,839	Clg Cfm/Ton 572.02	Plenum 75.0 68.0
Preheat	-0.0	16,839	68.0	59.7	Supply	0	0	Clg Sqft/Ton 167.64	Return 75.0 68.0
Reheat	0.0	0	0.0	0.0	Mincfm	16,839	16,839	Clg Btuh/Sqft 71.58	Ret/OA 77.4 68.0
Humidif	0.0	0	0.0	0.0	Return	3,368	0	No. People 70	Runarnd 75.0 68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA 0.0	Fn MtrTD 0.1 0.0
Total	-432.5				Rm Exh	0	0	Htg Cfm/Sqft 3.41	Fn BldTD 0.1 0.0
					Auxil	0	0	Htg Btuh/Sqft -87.64	Fn Frict 0.2 0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0	0	0	0.00	*	0	0.00	*	0	-10,810	8.39
Glass Solar	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0	0	0	0.00	*	0	0.00	*	-102,400	-118,067	91.61
Partition	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	-102,400	-128,877	100.00
Internal Loads												
Lights	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
People	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	*	-26,477	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0	0	0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0	0	0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Floor	3,593	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	3,593	0 0
						Wall	2,000	0 0

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-128.9	2,078	68.0	125.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	0	Clg Cfm/Ton	0.00	Plenum	0.0	43.2
Preheat	0.0	0	0.0	0.0	Supply	0	2,078	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	2,078	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-128.9				Rm Exh	0	0	Htg Cfm/Sqft	0.58	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-35.87	Fn Frict	0.0	0.0

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2	17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9	16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4	16.14
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1	16.60
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
5	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3	17.49
6	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5	18.15
7	VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7	13.66
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3	17.69
System 1	Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3	16.95
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
System 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5	16.46

BUILDING AREAS - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	CHAPLIN-CLASS RM	1 1	1,700	1,700	0	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1 1	2,274	2,274	0	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1 1	2,063	2,063	0	0	0	0	1,892	328	20	1,310
Zone 1	Total/Ave.			6,037	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1 1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone 2	Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1 1	1,310	1,310	0	0	0	0	1,806	181	18	850
6	CLASS RM	1 1	1,664	1,664	0	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1 1	128	128	0	0	0	0	198	192	80	48
Zone 3	Total/Ave.			3,102	0	0	0	0	4,230	592	22	2,058
System 1	Total/Ave.			14,074	350	0	0	0	15,978	3,646	28	9,184
4	NAVE	1 1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone 2	Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
System 2	Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1 1	3,593	3,593	0	0	0	0	3,593	0	0	2,000
Zone 4	Total/Ave.			3,593	0	0	0	0	3,593	0	0	2,000
System 3	Total/Ave.			3,593	0	0	0	0	3,593	0	0	2,000
Building				22,602	700	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTvr) = 5.99 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTvw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.1	18	144	-81,946	47	1,218	2,495.8	53	3,372	0.0	0	0
5 - 10	10.2	28	224	-163,892	10	271	4,991.5	0	0	0.0	0	0
10 - 15	15.3	17	137	-245,839	6	145	7,487.3	0	0	0.0	0	0
15 - 20	20.4	6	51	-327,785	6	145	9,983.0	14	856	0.0	0	0
20 - 25	25.6	11	86	-409,731	1	26	12,478.8	18	1,160	0.0	0	0
25 - 30	30.7	5	38	-491,677	0	9	14,974.6	0	0	0.0	0	0
30 - 35	35.8	0	0	-573,624	15	384	17,470.3	0	0	0.0	0	0
35 - 40	40.9	0	0	-655,570	1	33	19,966.1	0	0	0.0	0	0
40 - 45	46.0	5	37	-737,516	0	0	22,461.8	0	0	0.0	0	0
45 - 50	51.1	0	0	-819,463	0	0	24,957.6	0	0	0.0	0	0
50 - 55	56.2	0	0	-901,409	2	47	27,453.4	0	0	0.0	0	0
55 - 60	61.3	1	8	-983,355	5	138	29,949.1	0	0	0.0	0	0
60 - 65	66.4	5	37	-1,065,301	2	54	32,444.9	0	0	0.0	0	0
65 - 70	71.5	5	40	-1,147,248	1	21	34,940.6	3	168	0.0	0	0
70 - 75	76.7	0	0	-1,229,194	0	8	37,436.4	4	266	0.0	0	0
75 - 80	81.8	0	0	-1,311,140	1	34	39,932.2	0	0	0.0	0	0
80 - 85	86.9	0	0	-1,393,087	1	37	42,427.9	0	0	0.0	0	0
85 - 90	92.0	0	0	-1,475,033	1	36	44,923.7	3	214	0.0	0	0
90 - 95	97.1	0	0	-1,556,979	0	0	47,419.4	5	290	0.0	0	0
95 - 100	102.2	0	0	-1,638,925	0	0	49,915.2	0	0	0.0	0	0
Hours Off	0.0	0	7,958	0	0	6,154	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- BUILDING TEMPERATURE PROFILES -----

Temperature Range (F)	----- Zone Number -----				
	1	2	3	2	4
Max. Temp.	88.9	97.8	99.1	98.0	91.3
Mo./Hr.	7 22	7 23	7 24	7 23	7 24
Day Type	4	1	1	1	1
..... Number of Hours .....					
Above 100	0	0	0	0	0
95 - 100	0	45	318	45	0
90 - 95	0	479	1,165	390	90
85 - 90	363	1,059	721	1,058	971
80 - 85	1,318	1,278	974	1,250	1,243
75 - 80	1,890	731	528	853	1,013
70 - 75	233	229	255	225	355
65 - 70	1,981	1,419	590	1,425	1,963
60 - 65	1,221	956	940	954	1,334
55 - 60	538	559	522	572	752
50 - 55	457	892	831	875	1,039
Below 50	759	1,113	1,916	1,113	0
Min. Temp.	36.5	38.4	36.5	38.5	54.9
Mo./Hr.	2 7	2 12	2 13	2 11	1 7
Day Type	5	3	4	3	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	GAS	GAS DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	8,279	35	2,091	17
Feb	7,536	35	1,882	17
March	7,133	35	1,420	17
April	5,796	35	452	11
May	5,038	53	0	0
June	9,652	105	0	0
July	12,703	114	0	0
Aug	9,898	103	0	0
Sept	4,380	73	0	0
Oct	6,115	35	462	11
Nov	6,744	35	1,231	14
Dec	7,817	35	1,835	17
Total	90,891	114	9,373	17

Building Energy Consumption = 55,194 (Btu/Sq Ft/Year)  
Source Energy Consumption = 84,830 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION

[illegible]



EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

	ELEC	363	316	320	324	342	311	355	320	324	342	385	355	4,056
	PK	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1	EQ2001	GAS FIRE TUBE HOT WATER												
	GAS	2091	1882	1420	452	0	0	0	0	0	462	1231	1835	9,373
	PK	17.0	17.0	16.6	11.1	0.0	0.0	0.0	0.0	0.0	11.1	13.9	17.0	17.0
1	EQ5020	HEAT WATER CIRC. PUMP C.V.												
	ELEC	3087	2871	2163	1417	0	0	0	0	0	1409	1939	2707	15,593
	PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1	EQ5240	BOILER FORCED DRAFT FAN												
	ELEC	747	695	523	343	0	0	0	0	0	341	469	655	3,774
	PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1	EQ5307	BOILER CONTROLS												
	ELEC	207	192	145	95	0	0	0	0	0	94	130	182	1,046
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
REPLACE FLUORESCENT BALLASTS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 114.5 (kW)  
Yearly Time of Peak 12 (hr) 7 (mo)

Hour 12 Month 7

Eq. Ref.	Equipment Num. Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
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Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	90.0	78.59
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Sub Total			90.0	78.59
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Sub Total			0.0	0.00
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Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	9.6	8.40
2		SUMMATION OF FAN ELECTRICAL DEMAND	4.3	3.78

Sub Total			13.9	12.17
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Sub Total			0.0	0.00
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Miscellaneous

Lights			10.6	9.23
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Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			10.6	9.23
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Grand Total			114.5	100.00
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**                                     **
**          TRACE    600    ANALYSIS          **
**                                     **
**          by          **                                     **
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ENERGY SAVINGS OPPORTUNITY STUDY

CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 452

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 15:35: 5 2/ 3/94  
Dataset Name: CB452B .TM

AIRFLOW - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- SYSTEM SUMMARY -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	UV	4,541	30,864	30,864	34,413	8,090	0	0
2	SZ	3,368	16,839	16,839	18,461	16,839	0	0
3	UH	0	0	2,078	0	0	0	0
Totals		7,908	47,703	49,780	52,874	24,929	0	0

CAPACITY - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- SYSTEM SUMMARY -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating						
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	UV	72.5	0.0	0.0	72.5	-1,076,294	0	0	0	0	0	-1,076,294
2	SZ	29.4	0.0	0.0	29.4	-432,496	0	0	0	0	0	-432,496
3	UH	0.0	0.0	0.0	0.0	-128,877	0	0	0	0	0	-128,877
Totals		101.9	0.0	0.0	101.9	-1,637,667	0	0	0	0	0	-1,637,667

The building peaked at hour 16 month 7 with a capacity of 101.4 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	UV	14.71	2.19	425.7	194.1	61.82	2.19	-76.47	14,074
2	Main	SZ	20.00	3.41	572.0	167.6	71.58	3.41	-87.64	4,935
3	Main	UH	0.00	0.00	0.0	0.0	0.00	0.58	-35.87	3,593

System 1 Block UV - UNIT VENTILATOR

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct		Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	46,256	44,226		90,481	10.40	*	44,331	7.97	*	-38,497	-71,861	6.99
Glass Solar	195,227	0		195,227	22.44	*	212,025	38.11	*	0	0	0.00
Glass Cond	27,782	0		27,782	3.19	*	26,479	4.76	*	-133,751	-133,751	13.02
Wall Cond	154,963	25,413		180,375	20.73	*	165,455	29.74	*	-490,481	-574,084	55.88
Partition	175			175	0.02	*	175	0.03	*	-455	-455	0.04
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	136,320			136,320	15.67	*	55,492	9.98	*	-247,207	-247,207	24.06
Sub Total==>	560,723	69,638		630,361	72.45	*	503,957	90.59	*	-910,391	-1,027,359	100.00
Internal Loads												
Lights	28,035	0		28,035	3.22	*	23,168	4.16	*	0	0	0.00
People	49,545			49,545	5.69	*	20,293	3.65	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	77,580	0	0	77,580	8.92	*	43,461	7.81	*	0	0	0.00
Ceiling Load	10,372	-10,372		0	0.00	*	8,887	1.60	*	-12,139	0	0.00
Outside Air	0	0	0	174,382	20.04	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				6,584	0.76	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		-18,898	0	-18,898	-2.17	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	-0.00	*		0.00	*		0	0.00
Grand Total==>	648,674	40,368	0	870,008	100.00	*	556,305	100.00	*	-922,530	-1,027,359	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	72.5	870.0	670.2	30,864 80.6 65.3 71.2	58.3 56.1 65.5	14,074		
Aux Clg	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	Part 350		
Opt Vent	0.0	0.0	0.0	0 0.0 0.0 0.0	0.0 0.0 0.0	ExFlr 0		
Totals	72.5	870.0				Roof 15,978	0	0
						Wall 12,830	3,646	28

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	14.7	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	4,541	0	Clg Cfm/Sqft	2.19	SADB	58.4	95.5
Main Htg	-1,076.3	30,864	63.4	95.5	Infil	3,550	3,550	Clg Cfm/Ton	425.70	Plenum	78.8	59.0
Aux Htg	0.0	0	0.0	0.0	Supply	30,864	30,864	Clg Sqft/Ton	194.12	Return	78.8	63.8
Preheat	-0.0	30,864	62.1	58.2	Mincfm	0	0	Clg Btuh/Sqft	61.82	Ret/OA	80.5	63.8
Reheat	0.0	0	0.0	0.0	Return	30,864	30,864	No. People	198	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	4,541	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	2.19	Fn BldTD	0.0	0.0
Total	-1,076.3				Auxil	0	0	Htg Btuh/Sqft	-76.47	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/12 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 87/ 72/ 98.0 \* OADB: 89 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	30,496	0		30,496	8.63	*	44,331	16.20	*	-38,497	-38,497	8.90
Glass Solar	75,357	0		75,357	21.33	*	117,002	42.76	*	0	0	0.00
Glass Cond	10,550	0		10,550	2.99	*	14,326	5.24	*	-72,739	-72,739	16.82
Wall Cond	42,873	0		42,873	12.14	*	72,429	26.47	*	-207,867	-207,867	48.06
Partition	175			175	0.05	*	175	0.06	*	-455	-455	0.11
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	55,749			55,749	15.78	*	25,058	9.16	*	-112,938	-112,938	26.11
Sub Total==>	215,200	0		215,200	60.92	*	273,320	99.88	*	-432,496	-432,496	100.00
Internal Loads												
Lights	4,548	0		4,548	1.29	*	168	0.06	*	0	0	0.00
People	10,542			10,542	2.98	*	154	0.06	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.27	*	322	0.12	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	115,783	32.78	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				7,185	2.03	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	230,290	0	0	353,258	100.00	*	273,643	100.00	*	-432,496	-432,496	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	AREAS Glass (sf)	(%)
Main Clg	29.4	353.3	16,839	77.4 64.5 72.8	59.7 57.8 70.3	4,935		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	350		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	29.4	353.3				5,356	0	0
						5,231	1,983	38

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	20.0	Type	Clg	Htg
Main Htg	-432.5	16,839	68.0	91.6	Vent	3,368	0	Clg Cfm/Sqft	3.41	SADB	60.1	91.6
Aux Htg	0.0	0	0.0	0.0	Infil	1,622	1,622	Clg Cfm/Ton	572.02	Plenum	75.0	68.0
Preheat	-0.0	16,839	68.0	59.7	Supply	16,839	16,839	Clg Sqft/Ton	167.64	Return	75.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	71.58	Ret/OA	77.4	68.0
Humidif	0.0	0	0.0	0.0	Return	16,839	16,839	No. People	70	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	3,368	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Total	-432.5				Rm Exh	0	0	Htg Cfm/Sqft	3.41	Fn BldTD	0.1	0.0
					Auxil	0	0	Htg Btuh/Sqft	-87.64	Fn Frict	0.2	0.0

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-10,810	8.39
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-118,067	91.61
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-128,877	100.00
Internal Loads												
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0			0	0.00	*	0	0.00	*	-26,477	0	0.00
Outside Air	0		0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-128,877	-128,877	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	AREAS Glass (sf) (%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Floor 3,593	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part 0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr 0	
Totals	0.0	0.0				Roof 3,593	0 0
						Wall 2,000	0 0

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	AIRFLOWS (cfm) Cooling Heating	ENGINEERING CHECKS-- Clg % OA 0.0	TEMPERATURES (F)--- Type Clg Htg
Main Htg	-128.9	2,078	68.0	125.0	Vent	0	Clg Cfm/Sqft 0.00	SADB 0.0 125.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	Clg Cfm/Ton 0.00	Plenum 0.0 43.2
Preheat	0.0	0	0.0	0.0	Supply	0	Clg Sqft/Ton 0.00	Return 0.0 68.0
Reheat	0.0	0	0.0	0.0	Miscfm	0	Clg Btuh/Sqft 0.00	Ret/OA 0.0 68.0
Humidif	0.0	0	0.0	0.0	Return	0	No. People 0	Runarnd 0.0 68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	Htg % OA 0.0	Fn MtrTD 0.0 0.0
Total	-128.9				Rm Exh	0	Htg Cfm/Sqft 0.58	Fn BldTD 0.0 0.0
					Auxil	0	Htg Btuh/Sqft -35.87	Fn Frict 0.0 0.0

BUILDING U-VALUES - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	81.2	17.73
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	73.9	16.18
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	74.4	16.14
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	76.1	16.60
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
5	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	79.3	17.49
6	CLASS RM	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	82.5	18.15
7	VESTIBULE	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	60.7	13.66
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.560	0.573	1.000	0.297	80.3	17.69
System 1	Total/Ave.	0.100	0.000	0.000	0.000	0.076	0.560	0.573	1.000	0.297	77.3	16.95
4	NAVE	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
System 2	Total/Ave.	0.100	0.000	0.000	0.000	0.112	0.560	0.573	1.000	0.000	76.8	16.92
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.077	0.000	0.000	1.000	0.297	66.6	13.89
Building		0.100	0.000	0.000	0.000	0.084	0.560	0.573	1.000	0.297	75.5	16.46



BUILDING AREAS - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.				6,037	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	0	198	192	80	48
Zone	3 Total/Ave.				3,102	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.				14,074	350	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.				4,935	350	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.				3,593	0	0	0	0	3,593	0	0	2,000
Building					22,602	700	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.084 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.977 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.437 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.99 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 49.60 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btun)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	5.1	18	144	-81,883	46	1,202	2,489.0	53	3,372	0.0	0	0
5 - 10	10.2	28	224	-163,767	11	287	4,978.1	0	0	0.0	0	0
10 - 15	15.3	17	137	-245,650	6	145	7,467.1	0	0	0.0	0	0
15 - 20	20.4	6	51	-327,533	6	145	9,956.1	14	856	0.0	0	0
20 - 25	25.5	11	86	-409,417	1	26	12,445.1	18	1,160	0.0	0	0
25 - 30	30.6	5	38	-491,300	0	9	14,934.2	0	0	0.0	0	0
30 - 35	35.7	0	0	-573,183	15	384	17,423.2	0	0	0.0	0	0
35 - 40	40.8	0	0	-655,067	1	33	19,912.2	0	0	0.0	0	0
40 - 45	45.9	5	37	-736,950	0	0	22,401.2	0	0	0.0	0	0
45 - 50	51.0	0	0	-818,833	0	0	24,890.3	0	0	0.0	0	0
50 - 55	56.1	0	0	-900,717	2	47	27,379.3	0	0	0.0	0	0
55 - 60	61.2	1	8	-982,600	5	122	29,868.3	0	0	0.0	0	0
60 - 65	66.3	5	37	-1,064,484	3	70	32,357.3	0	0	0.0	0	0
65 - 70	71.4	5	40	-1,146,367	1	21	34,846.4	3	168	0.0	0	0
70 - 75	76.5	0	0	-1,228,250	0	8	37,335.4	4	266	0.0	0	0
75 - 80	81.6	0	0	-1,310,133	1	34	39,824.4	0	0	0.0	0	0
80 - 85	86.6	0	0	-1,392,017	1	20	42,313.4	0	0	0.0	0	0
85 - 90	91.7	0	0	-1,473,900	2	53	44,802.5	3	214	0.0	0	0
90 - 95	96.8	0	0	-1,555,784	0	0	47,291.5	5	290	0.0	0	0
95 - 100	101.9	0	0	-1,637,667	0	0	49,780.5	0	0	0.0	0	0
Hours Off	0.0	0	7,958	0	0	6,154	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----					
Temperature	----- Zone Number -----				
Range (F)	1	2	3	2	4
Max. Temp.	88.9	97.8	99.0	98.0	91.3
Mo./Hr.	7 22	7 23	7 24	7 23	7 24
Day Type	4	1	1	1	1
..... Number of Hours .....					
Above 100	0	0	0	0	0
95 - 100	0	45	318	45	0
90 - 95	0	479	1,115	390	90
85 - 90	363	1,059	767	1,058	971
80 - 85	1,318	1,278	959	1,250	1,243
75 - 80	1,890	731	547	853	1,013
70 - 75	217	229	153	225	355
65 - 70	1,997	1,419	682	1,425	1,963
60 - 65	1,221	956	918	954	1,334
55 - 60	538	559	546	572	752
50 - 55	457	892	822	875	1,039
Below 50	759	1,113	1,933	1,113	0
Min. Temp.	36.5	38.4	36.5	38.5	54.9
Mo./Hr.	2 7	2 12	2 12	2 11	1 7
Day Type	5	3	4	3	3

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	GAS	GAS DMND
	Off Peak (kWh)	On Peak (kW)	On Peak (Therm)	On Peak (Thrm/hr)
Jan	8,083	34	2,094	17
Feb	7,358	34	1,886	17
March	6,917	34	1,425	17
April	5,609	34	456	11
May	4,809	52	0	0
June	9,413	105	0	0
July	12,478	114	0	0
Aug	9,647	104	0	0
Sept	4,172	77	0	0
Oct	5,909	34	461	11
Nov	6,557	34	1,236	14
Dec	7,430	34	1,839	17
Total	88,382	114	9,397	17

Building Energy Consumption = 54,921 (Btu/Sq Ft/Year)  
Source Energy Consumption = 83,605 (Btu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

[illegible]

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

	ELEC	363	316	320	324	342	311	355	320	324	342	385	355	4,056
	PK	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
1	EQ2001	GAS FIRE TUBE HOT WATER												
	GAS	2094	1886	1425	456	0	0	0	0	0	461	1236	1839	9,397
	PK	17.0	17.0	16.6	11.1	0.0	0.0	0.0	0.0	0.0	11.2	14.0	17.0	17.0
1	EQ5020	HEAT WATER CIRC. PUMP C.V.												
	ELEC	3087	2871	2163	1417	0	0	0	0	0	1409	1939	2707	15,593
	PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1	EQ5240	BOILER FORCED DRAFT FAN												
	ELEC	747	695	523	343	0	0	0	0	0	341	469	655	3,774
	PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1	EQ5307	BOILER CONTROLS												
	ELEC	207	192	145	95	0	0	0	0	0	94	130	182	1,046
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
REPLACE FLUORESCENT FIXTURES

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        113.8    (kW)  
Yearly Time of Peak 12 (hr)    7 (mo)

Hour 12    Month    7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	89.9	78.94
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Sub Total			89.9	78.94
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Sub Total			0.0	0.00
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Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		9.6	8.42
2	SUMMATION OF FAN ELECTRICAL DEMAND		4.3	3.80

Sub Total			13.9	12.22
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Sub Total			0.0	0.00
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Miscellaneous

Lights			10.1	8.85
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			10.1	8.85

Grand Total			113.8	100.00
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 452

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 16: 6:30 2/ 3/94  
Dataset Name: CB452B .TM



AIRFLOW - ALTERNATIVE 3  
COMBINED ECOS

----- SYSTEM SUMMARY -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	UV	4,243	29,080	29,080	31,485	6,648	0	0
2	SZ	3,157	15,787	15,787	16,885	15,787	0	0
3	UH	0	0	2,023	0	0	0	0
Totals		7,401	44,867	46,891	48,370	22,435	0	0

CAPACITY - ALTERNATIVE 3  
COMBINED ECOS

----- SYSTEM SUMMARY -----  
(Design Capacity Quantities)

		Cooling				Heating						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
System	System	Capacity	Capacity	Capacity	Totals	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Totals
Number	Type	(Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)
1	UV	64.1	0.0	0.0	64.1	-967,144	0	0	0	0	0	-967,144
2	SZ	27.5	0.0	0.0	27.5	-385,578	0	0	0	0	0	-385,578
3	UH	0.0	0.0	0.0	0.0	-125,512	0	0	0	0	0	-125,512
Totals		91.6	0.0	0.0	91.6	-1,478,235	0	0	0	0	0	-1,478,235

The building peaked at hour 16 month 7 with a capacity of 90.3 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
COMBINED ECOS

----- ENGINEERING CHECKS -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	UV	14.59	2.07	454.0	219.7	54.61	2.07	-68.72	14,074
2	Main	SZ	20.00	3.20	573.7	179.3	66.91	3.20	-78.13	4,935
3	Main	UH	0.00	0.00	0.0	0.0	0.00	0.56	-34.93	3,593

System 1 Block UV - UNIT VENTILATOR

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/16 \* Mo/Hr: 7/16 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 91 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct	Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot	Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)	(Btuh)	(Btuh)	(%)
Envelope Loads											
Skylite Solr	0	0		0	0.00		0	0.00	0	0	0.00
Skylite Cond	0	0		0	0.00		0	0.00	0	0	0.00
Roof Cond	33,525	19,776		53,302	6.93		32,475	6.45	-28,011	-43,802	4.76
Glass Solar	194,827	0		194,827	25.35		218,109	43.33	0	0	0.00
Glass Cond	27,782	0		27,782	3.61		26,077	5.18	-133,751	-133,751	14.53
Wall Cond	140,644	24,216		164,860	21.45		140,606	27.94	-490,481	-575,287	62.48
Partition	175			175	0.02		175	0.03	-455	-455	0.05
Exposed Floor	0			0	0.00		0	0.00	0	0	0.00
Infiltration	92,345			92,345	12.01		37,066	7.36	-167,463	-167,463	18.19
Sub Total==>	489,299	43,993		533,292	69.38		454,508	90.30	-820,161	-920,758	100.00
Internal Loads											
Lights	27,866	0		27,866	3.63		22,757	4.52	0	0	0.00
People	49,413			49,413	6.43		20,086	3.99	0	0	0.00
Misc	0	0	0	0	0.00		0	0.00	0	0	0.00
Sub Total==>	77,279	0	0	77,279	10.05		42,843	8.51	0	0	0.00
Ceiling Load	6,538	-6,538		0	0.00		5,966	1.19	-10,628	0	0.00
Outside Air	0	0	0	162,971	21.20		0	0.00	0	0	0.00
Sup. Fan Heat				6,204	0.81			0.00		0	0.00
Ret. Fan Heat		0		0	0.00			0.00		0	0.00
Duct Heat Pkup		0		0	0.00			0.00		0	0.00
OV/UNDR Sizing	0			0	0.00		0	0.00	0	0	0.00
Exhaust Heat		-11,132	0	-11,132	-1.45			0.00		0	0.00
Terminal Bypass		0	0	0	-0.00			0.00		0	0.00
Grand Total==>	573,115	26,323	0	768,613	100.00		503,317	100.00	-830,789	-920,758	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	64.1	768.6	599.8	29,080 79.4 64.9 71.1	59.0 56.3 65.0	14,074		
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	350		
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	64.1	768.6				15,978	0	0
						12,830	3,646	28

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	14.6	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F				Clg Cfm/Sqft	2.07	SADB	59.1	94.3
Main Htg	-967.1	29,080	63.7	94.3	Infil	2,404	2,404	Clg Cfm/Ton	454.02	Plenum	77.4	59.8
Aux Htg	0.0	0	0.0	0.0	Supply	29,080	29,080	Clg Sqft/Ton	219.73	Return	77.4	64.1
Preheat	-0.0	29,080	62.4	58.9	Mincfm	0	0	Clg Btuh/Sqft	54.61	Ret/OA	79.3	64.1
Reheat	0.0	0	0.0	0.0	Return	29,080	29,080	No. People	198	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	4,243	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	2.07	Fn BldTD	0.0	0.0
Total	-967.1				Auxil	0	0	Htg Btuh/Sqft	-68.72	Fn Frict	0.1	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 2 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/12 \* Mo/Hr: 7/17 \* Mo/Hr: 13/1  
Outside Air ==> OADB/WB/HR: 87/ 72/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct	Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot	Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)	(Btuh)	(Btuh)	(%)
Envelope Loads											
Skylite Solr	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Roof Cond	21,096	0	0	21,096	6.39	*	32,475	13.33	-28,011	-28,011	7.26
Glass Solar	75,357	0	0	75,357	22.82	*	117,002	48.02	0	0	0.00
Glass Cond	10,550	0	0	10,550	3.19	*	14,326	5.88	-72,739	-72,739	18.87
Wall Cond	54,890	0	0	54,890	16.62	*	62,360	25.60	-207,867	-207,867	53.91
Partition	175	0	0	175	0.05	*	175	0.07	-455	-455	0.12
Exposed Floor	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Infiltration	37,766	0	0	37,766	11.44	*	16,975	6.97	-76,506	-76,506	19.84
Sub Total==>	199,833	0	0	199,833	60.52	*	243,312	99.87	-385,578	-385,578	100.00
Internal Loads											
Lights	4,548	0	0	4,548	1.39	*	168	0.07	0	0	0.00
People	10,542	0	0	10,542	3.19	*	154	0.06	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Sub Total==>	15,090	0	0	15,090	4.57	*	322	0.13	0	0	0.00
Ceiling Load	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Outside Air	0	0	0	108,547	32.87	*	0	0.00	0	0	0.00
Sup. Fan Heat	0	0	0	6,736	2.04	*	0	0.00	0	0	0.00
Ret. Fan Heat	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Duct Heat Pkup	0	0	0	0	0.00	*	0	0.00	0	0	0.00
OV/UNDR Sizing	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Exhaust Heat	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Terminal Bypass	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Grand Total==>	214,923	0	0	330,206	100.00	*	243,635	100.00	-385,578	-385,578	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	27.5	330.2	15,787	77.4 64.5 72.8	60.4 57.8 69.2	4,935		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	350		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	27.5	330.2				5,356	0	0
						5,231	1,983	38

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	20.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F				Clg Cfm/Sqft		SADB	60.8	90.4
Main Htg	-385.6	15,787	68.0	90.4	Infil	1,099	1,099	Clg Cfm/Ton	573.71	Plenum	75.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	15,787	15,787	Clg Sqft/Ton	179.34	Return	75.0	68.0
Preheat	-0.0	15,787	68.0	60.4	Mincfm	0	0	Clg Btuh/Sqft	66.91	Ret/OA	77.4	68.0
Reheat	0.0	0	0.0	0.0	Return	15,787	15,787	No. People	70	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	3,157	0	Htg % OA	0.0	Fn MtrTD	0.1	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	3.20	Fn BldTD	0.1	0.0
Total	-385.6				Auxil	0	0	Htg Btuh/Sqft	-78.13	Fn Frict	0.2	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	-6,183	4.93
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-102,400	-119,329	95.07
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-102,400	-125,512	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-23,112	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-125,512	-125,512	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F	Leaving DB/WB/HR Deg F	Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0	0.0	0.0	Floor	3,593	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	Part	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	ExFlr	0	
Totals	0.0	0.0					Roof	3,593	0 0
							Wall	2,000	0 0

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-125.5	2,023	68.0	125.0	Infil	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	125.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	2,023	Clg Cfm/Ton	0.00	Plenum	0.0	46.3
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	2,023	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-125.5				Auxil	0	0	Htg Cfm/Sqft	0.56	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-34.93	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 3  
COMBINED ECOS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Part.	ExFlr	Room U-Values (Btu/hr/sqft/F)							Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
				Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
1	CHAPLIN-CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	84.0	18.30
2	SM CHAPEL-CLASS	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	76.5	16.69
3	ASSEMBLY	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	76.9	16.63
Zone 1	Total/Ave.	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	78.7	17.12
4	NAVE	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
5	CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	82.3	18.08
6	CLASS RM	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	85.6	18.75
7	VESTIBULE	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	63.1	14.15
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.027	0.560	0.573	1.000	0.297	83.2	18.28
System 1	Total/Ave.	0.100	0.000	0.000	0.000	0.045	0.560	0.573	1.000	0.297	79.7	17.43
4	NAVE	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
Zone 2	Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
System 2	Total/Ave.	0.100	0.000	0.000	0.000	0.082	0.560	0.573	1.000	0.000	78.6	17.28
8	MECH RM-CORRIDOR	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07
System 3	Total/Ave.	0.000	0.000	0.000	0.000	0.041	0.000	0.000	1.000	0.297	73.3	16.07
Building		0.100	0.000	0.000	0.000	0.052	0.560	0.573	1.000	0.297	78.4	17.18

BUILDING AREAS - ALTERNATIVE 3  
COMBINED ECOS

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
1	CHAPLIN-CLASS RM	1	1	1,700	1,700	0	0	0	1,950	341	22	1,192
2	SM CHAPEL-CLASS	1	1	2,274	2,274	0	0	0	2,550	403	23	1,376
3	ASSEMBLY	1	1	2,063	2,063	0	0	0	1,892	328	20	1,310
Zone	1 Total/Ave.			6,037	0	0	0	0	6,392	1,071	22	3,878
4	NAVE	1	1	4,935	4,935	350	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
5	CLASS RM	1	1	1,310	1,310	0	0	0	1,806	181	18	850
6	CLASS RM	1	1	1,664	1,664	0	0	0	2,226	219	16	1,160
7	VESTIBULE	1	1	128	128	0	0	0	198	192	80	48
Zone	3 Total/Ave.			3,102	0	0	0	0	4,230	592	22	2,058
System	1 Total/Ave.			14,074	350	0	0	0	15,978	3,646	28	9,184
4	NAVE	1	1	4,935	4,935	350	0	0	5,356	1,983	38	3,248
Zone	2 Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
System	2 Total/Ave.			4,935	350	0	0	0	5,356	1,983	38	3,248
8	MECH RM-CORRIDOR	1	1	3,593	3,593	0	0	0	3,593	0	0	2,000
Zone	4 Total/Ave.			3,593	0	0	0	0	3,593	0	0	2,000
System	3 Total/Ave.			3,593	0	0	0	0	3,593	0	0	2,000
Building				22,602	700	0	0	0	24,927	5,630	28	14,431

ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
COMBINED ECOS

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.052 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.877 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.420 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTvr) = 3.35 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTvw) = 49.04 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	4.6	22	199	-73,912	49	1,265	2,344.5	53	3,372	0.0	0	0
5 - 10	9.2	23	208	-147,823	7	190	4,689.1	0	0	0.0	0	0
10 - 15	13.7	12	109	-221,735	6	157	7,033.6	0	0	0.0	0	0
15 - 20	18.3	10	93	-295,647	5	140	9,378.1	14	856	0.0	0	0
20 - 25	22.9	11	101	-369,559	2	45	11,722.6	18	1,160	0.0	0	0
25 - 30	27.5	5	46	-443,470	0	4	14,067.2	0	0	0.0	0	0
30 - 35	32.0	4	36	-517,382	15	390	16,411.7	0	0	0.0	0	0
35 - 40	36.6	0	4	-591,294	0	0	18,756.2	0	0	0.0	0	0
40 - 45	41.2	0	4	-665,206	0	6	21,100.8	0	0	0.0	0	0
45 - 50	45.8	0	0	-739,117	0	0	23,445.3	0	0	0.0	0	0
50 - 55	50.4	0	0	-813,029	3	89	25,789.8	0	0	0.0	0	0
55 - 60	54.9	0	0	-886,941	4	112	28,134.3	0	0	0.0	0	0
60 - 65	59.5	2	22	-960,853	2	42	30,478.9	0	0	0.0	0	0
65 - 70	64.1	7	60	-1,034,764	1	17	32,823.4	3	168	0.0	0	0
70 - 75	68.7	2	15	-1,108,676	0	4	35,167.9	4	266	0.0	0	0
75 - 80	73.3	2	20	-1,182,588	2	54	37,512.5	0	0	0.0	0	0
80 - 85	77.8	0	0	-1,256,500	1	37	39,857.0	0	0	0.0	0	0
85 - 90	82.4	1	5	-1,330,411	1	20	42,201.5	8	504	0.0	0	0
90 - 95	87.0	0	0	-1,404,323	0	0	44,546.0	0	0	0.0	0	0
95 - 100	91.6	0	0	-1,478,235	0	0	46,890.6	0	0	0.0	0	0
Hours Off	0.0	0	7,838	0	0	6,188	0.0	0	2,434	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
 COMBINED ECOS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----					
Temperature	----- Zone Number -----				
Range (F)	1	2	3	2	4
Max. Temp.	88.7	97.2	98.5	97.4	89.5
Mo./Hr.	7 21	7 23	7 23	7 23	7 24
Day Type	4	1	1	1	1
..... Number of Hours .....					
Above 100	0	0	0	0	0
95 - 100	0	45	408	45	0
90 - 95	0	550	1,244	440	0
85 - 90	319	1,056	820	1,026	972
80 - 85	1,303	1,359	813	1,395	1,316
75 - 80	2,050	669	438	773	1,001
70 - 75	150	175	340	175	383
65 - 70	1,942	1,480	535	1,485	1,939
60 - 65	1,286	950	928	945	1,473
55 - 60	599	636	553	642	712
50 - 55	445	927	946	921	964
Below 50	666	913	1,735	913	0
Min. Temp.	37.6	39.5	37.7	39.5	54.9
Mo./Hr.	2 7	2 6	2 12	2 6	2 8
Day Type	5	4	4	4	3



MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	GAS On Peak (Therm)	GAS DMND On Peak (Thrm/hr)
Jan	8,099	33	1,911	15
Feb	7,366	33	1,718	15
March	6,818	33	1,280	15
April	5,311	33	310	10
May	5,661	61	0	0
June	9,950	100	0	0
July	12,337	114	0	0
Aug	10,197	100	0	0
Sept	5,009	87	0	0
Oct	5,594	33	288	10
Nov	6,523	33	1,101	13
Dec	7,264	33	1,693	15
Total	90,128	114	8,300	15

Building Energy Consumption = 50,330 (8tu/Sq Ft/Year)  
Source Energy Consumption = 79,487 (8tu/Sq Ft/Year)

Floor Area = 22,602 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

[illegible]

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3  
COMBINED ECOS

ELEC	341	296	300	304	320	292	332	300	304	320	361	332	3,803
PK	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
1 EQ2001	GAS FIRE TUBE HOT WATER												
GAS	1911	1718	1280	310	0	0	0	0	0	288	1101	1693	8,300
PK	15.3	15.3	15.0	10.1	0.0	0.0	0.0	0.0	0.0	10.0	13.2	15.3	15.3
1 EQ5020	HEAT WATER CIRC. PUMP C.V.												
ELEC	3177	2946	2163	1260	0	0	0	0	0	1245	1991	2655	15,436
PK	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0	0.0	7.5	7.5	7.5	7.5
1 EQ5240	BOILER FORCED DRAFT FAN												
ELEC	769	713	523	305	0	0	0	0	0	301	482	643	3,736
PK	1.8	1.8	1.8	1.8	0.0	0.0	0.0	0.0	0.0	1.8	1.8	1.8	1.8
1 EQ5307	BOILER CONTROLS												
ELEC	213	198	145	84	0	0	0	0	0	84	133	178	1,035
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 113.6 (kW)  
Yearly Time of Peak 11 (hr) 7 (mo)

Hour 11 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1122L	AIR-CLD RECIP >55 TONS	90.3	79.49
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Sub Total			90.3	79.49
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Sub Total			0.0	0.00
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Air Moving Equipment

1	SUMMATION OF FAN ELECTRICAL DEMAND		9.0	7.90
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2	SUMMATION OF FAN ELECTRICAL DEMAND		4.1	3.57
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Sub Total			13.0	11.46
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Sub Total			0.0	0.00
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Miscellaneous

Lights			10.3	9.04
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Base Utilities			0.0	0.00
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Misc Equipment			0.0	0.00
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Sub Total			10.3	9.04
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Grand Total			113.6	100.00
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*Building 901*  
*Trace Input File*

933702

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4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 901

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

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16 20/4/2/OLD PRO SHOP/389/1/2/.7//9.3

17 20/5/2/NEW PRO SHOP/600/1/2/0//8.6

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32 24/2/2/27/7//194/90

33 24/3/1/15/8.5//139/270

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35 24/5/1/19/7.25//196/270

36 24/5/2/30/7.25//196/0

37 24/6/1/31/11//197/180

38 24/6/2/41/9//197/270

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52 25/7/2/3.5/1.75/2/.81/.64

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54 26/M/CBGHP&L/CBGHP&L/OFF//OFF/CBGHCLG/CBGHHTG/OFF/CBGHP&L/OFF

55 27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND

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LINE #	-----
59	29/4/////0.45/CFM-SF/0.45/CFM-SF
60	29/5/////0.45/CFM-SF/0.45/CFM-SF
61	29/6/////1.16/CFM-SF/1.16/CFM-SF
62	29/7/////0.45/CFM-SF
63	29/8/////0.45/CFM-SF/0.45/CFM-SF
64	29/9/////0.45/CFM-SF
65	30/1///1086/CFM////1000/CFM
66	30/2///1200/CFM
67	30/3///315/CFM////700/CFM
68	30/4/1.11/CFM-SF
69	30/5/1.11/CFM-SF
70	30/6/2000/CFM
71	30/7
72	30/8/150/CFM
73	30/9///600/CFM
74	31/3/1/44/8.5//198/PRORATED
75	SYSTEM - 1
76	39/1/BASE BUILDING
77	40/1/SZ
78	41/1/2/2/4/4
79	42/1/.15
80	45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
81	40/2/RAD
82	41/2/2/3
83	42/2
84	45/2/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
85	40/3/UH
86	41/3/1/1/5/5
87	42/3///.1////.125
88	45/3/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
89	EQUIPMENT - 1
90	59/1/CARLISLE///BASE BUILDING
91	60/1/1/PKPLANT/1/1
92	62/1/EQ1161/3/39/MBH
93	65/1/1//2/3
94	67/1/EQ2005/1/.17/HP
95	69/1/EQ4003
96	69/2
97	69/3
98	LOAD - 2
99	19/2/WALL & ROOF INSULATION
100	20/1/1/LOCKER & MAINTNC/736/1/2/0//9.3
101	20/2/1/CART MAINTENANCE/1000/1/2/0//8.6
102	20/3/1/LOCKER ROOM/714/1/2/0//9.3
103	20/4/2/OLD PRO SHOP/389/1/2/.7//9.3
104	20/5/2/NEW PRO SHOP/600/1/2/0//8.6
105	20/6/2/LOUNGE/1308/1/2/0//11
106	20/7/3/TOILETS, LOCKERS/775/1/2/0//10
107	20/8/4/OFFICE/145/1/2/0//9.3
108	20/9/5/STAIRS/169/1/2/0//20
109	21/M////CBGHTX///CBGHTX
110	22/2/1/YES////192
111	22/5/1/YES////192
112	22/6/1/NO/41/16//120/270/72
113	22/6/2/NO/41/16//120/90/72
114	22/7/1/YES////162
115	22/9/1/YES////162
116	24/1/1/32/8.5//121/90

CONTENTS OF : E:\CB901.TM

LINE #	-----
117	24/1/2/23/8.5//121/180
118	24/2/1/37/7//194/0
119	24/2/2/27/7//194/90
120	24/3/1/15/8.5//121/270
121	24/4/1/11/8.5//122/270
122	24/5/1/19/7.25//123/270
123	24/5/2/30/7.25//123/0
124	24/6/1/31/11//124/180
125	24/6/2/41/9//124/270
126	24/6/3/30/11//124/0
127	24/7/1/23/8.5//121/0
128	24/7/2/32/8.5//121/90
129	24/7/3/26/8.5//121/180
130	25/1/1/3.5/2/2/.81/.64
131	25/2/1/3.5/1.2/4/.81/.64
132	25/3/1/3.5/2/2/.81/.64
133	25/4/1/15.75/1/1/.81/.64
134	25/5/2/81/1/1/.81/.64
135	25/6/1/42.7/1/1/.81/.64
136	25/6/2/17.4/1/4/.81/.64
137	25/6/3/195/1/1/1.04/.95
138	25/7/1/28.6/1/1/.81/.64
139	25/7/2/3.5/1.75/2/.81/.64
140	25/7/3/3.5/1.75/2/.81/.64
141	26/M/CBGHP&L/CBGHP&L/OFF//OFF/CBGHCLG/CBGHHTG/OFF/CBGHP&L/OFF
142	27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND
143	29/1////////1.05/CFM-SF
144	29/2////////1.05/CFM-SF
145	29/3////////.41/CFM-SF
146	29/4////////.41/CFM-SF/.41/CFM-SF
147	29/5////////.41/CFM-SF/.41/CFM-SF
148	29/6////////1.05/CFM-SF/1.05/CFM-SF
149	29/7////////.41/CFM-SF
150	29/8////////.41/CFM-SF/.41/CFM-SF
151	29/9////////.41/CFM-SF
152	30/1///1086/CFM/////1000/CFM
153	30/2///1200/CFM
154	30/3///315/CFM/////700/CFM
155	30/4/1.11/CFM-SF
156	30/5/1.11/CFM-SF
157	30/6/2000/CFM
158	30/7
159	30/8/150/CFM
160	30/9///600/CFM
161	31/3/1/44/8.5//198/PRORATED
162	SYSTEM - 2
163	39/2/WALL & ROOF INSULATION
164	40/1/SZ
165	41/1/2/2/4/4
166	42/1/.15
167	45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
168	40/2/RAD
169	41/2/2/3
170	42/2
171	45/2/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
172	40/3/UH
173	41/3/1/1/5/5
174	42/3//.1////.125



CONTENTS OF : E:\CB901.TM

LINE #	
175	45/3/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
176	EQUIPMENT - 2
177	59/2/CARLISLE///WALL & ROOF INSULATION
178	60/1/1/PKPLANT/1/1
179	62/1/EQ1161/3/39/MBH
180	65/1/1//2/3
181	67/1/EQ2005/1/.17/HP
182	69/1/EQ4003
183	69/2
184	69/3
185	LOAD - 3
186	19/3/DOUBLE GLAZED WINDOWS
187	20/1/1/LOCKER & MAINTNC/736/1/2/0//9.3
188	20/2/1/CART MAINTENANCE/1000/1/2/0//8.6
189	20/3/1/LOCKER ROOM/714/1/2/0//9.3
190	20/4/2/OLD PRO SHOP/389/1/2/.7//9.3
191	20/5/2/NEW PRO SHOP/600/1/2/0//8.6
192	20/6/2/LOUNGE/1308/1/2/0//11
193	20/7/3/TOILETS, LOCKERS/775/1/2/0//10
194	20/8/4/OFFICE/145/1/2/0//9.3
195	20/9/5/STAIRS/169/1/2/0//20
196	21/M////CBGHTX///CBGHTX
197	22/2/1/YES////192
198	22/5/1/YES////192
199	22/6/1/NO/41/16//193/270/72
200	22/6/2/NO/41/16//193/90/72
201	22/7/1/YES////154
202	22/9/1/YES////154
203	24/1/1/32/8.5//139/90
204	24/1/2/23/8.5//139/180
205	24/2/1/37/7//194/0
206	24/2/2/27/7//194/90
207	24/3/1/15/8.5//139/270
208	24/4/1/11/8.5//195/270
209	24/5/1/19/7.25//196/270
210	24/5/2/30/7.25//196/0
211	24/6/1/31/11//197/180
212	24/6/2/41/9//197/270
213	24/6/3/30/11//197/0
214	24/7/1/23/8.5//139/0
215	24/7/2/32/8.5//139/90
216	24/7/3/26/8.5//139/180
217	25/1/1/3.5/2/2/.30/.55
218	25/2/1/3.5/1.2/4/.30/.55
219	25/3/1/3.5/2/2/.30/.55
220	25/4/1/15.75/1/1/.30/.55
221	25/5/2/81/1/1/.30/.55
222	25/6/1/42.7/1/1/.30/.55
223	25/6/2/17.4/1/4/.30/.55
224	25/6/3/195/1/1/.30/.55
225	25/7/1/28.6/1/1/.30/.55
226	25/7/2/3.5/1.75/2/.30/.55
227	25/7/3/3.5/1.75/2/.30/.55
228	26/M/CBGHP&L/CBGHP&L/OFF//OFF/CBGHCLG/CBGHHTG/OFF/CBGHP&L/OFF
229	27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND
230	29/1////////.970/CFM-SF
231	29/2////////.970/CFM-SF
232	29/3////////.38/CFM-SF

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LINE #	-----
233	29/4/////38/CFM-SF/.38/CFM-SF
234	29/5/////38/CFM-SF/.38/CFM-SF
235	29/6/////970/CFM-SF/.970/CFM-SF
236	29/7/////38/CFM-SF
237	29/8/////38/CFM-SF/.38/CFM-SF
238	29/9/////38/CFM-SF
239	30/1///1086/CFM/////1000/CFM
240	30/2///1200/CFM
241	30/3///315/CFM/////700/CFM
242	30/4/1.11/CFM-SF
243	30/5/1.11/CFM-SF
244	30/6/2000/CFM
245	30/7
246	30/8/150/CFM
247	30/9///600/CFM
248	31/3/1/44/8.5//198/PRORATED
249	SYSTEM - 3
250	39/3/DOUBLE GLAZED WINDOWS
251	40/1/SZ
252	41/1/2/2/4/4
253	42/1/.15
254	45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
255	40/2/RAD
256	41/2/2/3
257	42/2
258	45/2/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
259	40/3/UH
260	41/3/1/1/5/5
261	42/3//.1/////125
262	45/3/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
263	EQUIPMENT - 3
264	59/3/CARLISLE///DOUBLE GLAZED WINDOWS
265	60/1/1/PKPLANT/1/1
266	62/1/EQ1161/3/39/MBH
267	65/1/1//2/3
268	67/1/EQ2005/1/.17/HP
269	69/1/EQ4003
270	69/2
271	69/3
272	LOAD - 4
273	19/4/WEATHERSTRIP & CAULKING
274	20/1/1/LOCKER & MAINTNC/736/1/2/0//9.3
275	20/2/1/CART MAINTENANCE/1000/1/2/0//8.6
276	20/3/1/LOCKER ROOM/714/1/2/0//9.3
277	20/4/2/OLD PRO SHOP/389/1/2/.7//9.3
278	20/5/2/NEW PRO SHOP/600/1/2/0//8.6
279	20/6/2/LOUNGE/1308/1/2/0//11
280	20/7/3/TOILETS, LOCKERS/775/1/2/0//10
281	20/8/4/OFFICE/145/1/2/0//9.3
282	20/9/5/STAIRS/169/1/2/0//20
283	21/M////CBGHTX///CBGHTX
284	22/2/1/YES////192
285	22/5/1/YES////192
286	22/6/1/NO/41/16//193/270/72
287	22/6/2/NO/41/16//193/90/72
288	22/7/1/YES////154
289	22/9/1/YES////154
290	24/1/1/32/8.5//139/90

CONTENTS OF : E:\CB901.TM

LINE #	
291	24/1/2/23/8.5//139/180
292	24/2/1/37/7//194/0
293	24/2/2/27/7//194/90
294	24/3/1/15/8.5//139/270
295	24/4/1/11/8.5//195/270
296	24/5/1/19/7.25//196/270
297	24/5/2/30/7.25//196/0
298	24/6/1/31/11//197/180
299	24/6/2/41/9//197/270
300	24/6/3/30/11//197/0
301	24/7/1/23/8.5//139/0
302	24/7/2/32/8.5//139/90
303	24/7/3/26/8.5//139/180
304	25/1/1/3.5/2/2/.81/.64
305	25/2/1/3.5/1.2/4/.81/.64
306	25/3/1/3.5/2/2/.81/.64
307	25/4/1/15.75/1/1/.81/.64
308	25/5/2/81/1/1/.81/.64
309	25/6/1/42.7/1/1/.81/.64
310	25/6/2/17.4/1/4/.81/.64
311	25/6/3/195/1/1/1.04/.95
312	25/7/1/28.6/1/1/.81/.64
313	25/7/2/3.5/1.75/2/.81/.64
314	25/7/3/3.5/1.75/2/.81/.64
315	26/M/CBGHP&L/CBGHP&L/OFF//OFF/CBGHCLG/CBGHHTG/OFF/CBGHP&L/OFF
316	27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND
317	29/1////////.770/CFM-SF
318	29/2////////.770/CFM-SF
319	29/3////////.30/CFM-SF
320	29/4////////.30/CFM-SF/.30/CFM-SF
321	29/5////////.30/CFM-SF/.30/CFM-SF
322	29/6////////.770/CFM-SF/.770/CFM-SF
323	29/7////////.30/CFM-SF
324	29/8////////.30/CFM-SF/.30/CFM-SF
325	29/9////////.30/CFM-SF
326	30/1///1086/CFM/////1000/CFM
327	30/2///1200/CFM
328	30/3///315/CFM/////700/CFM
329	30/4/1.11/CFM-SF
330	30/5/1.11/CFM-SF
331	30/6/2000/CFM
332	30/7
333	30/8/150/CFM
334	30/9///600/CFM
335	31/3/1/44/8.5//198/PRORATED
336	SYSTEM - 4
337	39/4/WEATHERSTRIP & CAULKING
338	40/1/SZ
339	41/1/2/2/4/4
340	42/1/.15
341	45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
342	40/2/RAD
343	41/2/2/3
344	42/2
345	45/2/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
346	40/3/UH
347	41/3/1/1/5/5
348	42/3//.1////.125

CONTENTS OF : E:\CB901.TM

LINE #	-----
349	45/3/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
350	EQUIPMENT - 4
351	59/4/CARLISLE///WEATHERSTRIP & CAULKING
352	60/1/1/PKPLANT/1/1
353	62/1/EQ1161/3/39/MBH
354	65/1/1//2/3
355	67/1/EQ2005/1/.17/HP
356	69/1/EQ4003
357	69/2
358	69/3

CONTENTS OF : E:\CB901B.TM

LINE # -----

1 JOB - 1

2 01/ENERGY SAVINGS OPPORTUNITY STUDY

3 01/CARLISLE BARRACKS, PA

4 01/DEPARTMENT OF THE ARMY

5 01/BENATEC ASSOCIATES

6 01/BUILDING 901

7 08/CARLISLE

8 09/MAY/SEP////APR/OCT

9 10/CLTD-CLF

10 11///ZONE

11 LOAD - 1

12 19/1/COMBINED ECOS

13 20/1/1/LOCKER & MAINTNC/736/1/2/0//9.3

14 20/2/1/CART MAINTENANCE/1000/1/2/0//8.6

15 20/3/1/LOCKER ROOM/714/1/2/0//9.3

16 20/4/2/OLD PRO SHOP/389/1/2/.7//9.3

17 20/5/2/NEW PRO SHOP/600/1/2/0//8.6

18 20/6/2/LOUNGE/1308/1/2/0//11

19 20/7/3/TOILETS, LOCKERS/775/1/2/0//10

20 20/8/4/OFFICE/145/1/2/0//9.3

21 20/9/5/STAIRS/169/1/2/0//20

22 21/M////CBGHTX///CBGHTX

23 22/2/1/YES////192

24 22/5/1/YES////192

25 22/6/1/NO/41/16//120/270/72

26 22/6/2/NO/41/16//120/90/72

27 22/7/1/YES////162

28 22/9/1/YES////162

29 24/1/1/32/8.5//121/90

30 24/1/2/23/8.5//121/180

31 24/2/1/37/7//194/0

32 24/2/2/27/7//194/90

33 24/3/1/15/8.5//121/270

34 24/4/1/11/8.5//122/270

35 24/5/1/19/7.25//123/270

36 24/5/2/30/7.25//123/0

37 24/6/1/31/11//124/180

38 24/6/2/41/9//124/270

39 24/6/3/30/11//124/0

40 24/7/1/23/8.5//121/0

41 24/7/2/32/8.5//121/90

42 24/7/3/26/8.5//121/180

43 25/1/1/3.5/2/2/.81/.64

44 25/2/1/3.5/1.2/4/.81/.64

45 25/3/1/3.5/2/2/.81/.64

46 25/4/1/15.75/1/1/.81/.64

47 25/5/2/81/1/1/.81/.64

48 25/6/1/42.7/1/1/.81/.64

49 25/6/2/17.4/1/4/.81/.64

50 25/6/3/195/1/1/1.04/.95

51 25/7/1/28.6/1/1/.81/.64

52 25/7/2/3.5/1.75/2/.81/.64

53 25/7/3/3.5/1.75/2/.81/.64

54 26/M/CBGHP&L/CBGHP&L/OFF//OFF/CBGHCLG/CBGHHTG/OFF/CBGHP&L/OFF

55 27/M/324/SF-PERS/315/325/1.5/WATT-SF/INCAND

56 29/1////////.590/CFM-SF

57 29/2////////.590/CFM-SF

58 29/3////////.23/CFM-SF

CONTENTS OF : E:\CB901B.TM

LINE #	-----
59	29/4/////23/CFM-SF/.23/CFM-SF
60	29/5/////23/CFM-SF/.23/CFM-SF
61	29/6/////590/CFM-SF/.590/CFM-SF
62	29/7/////23/CFM-SF
63	29/8/////23/CFM-SF/.23/CFM-SF
64	29/9/////23/CFM-SF
65	30/1///1086/CFM/////1000/CFM
66	30/2///1200/CFM
67	30/3///315/CFM/////700/CFM
68	30/4/1.11/CFM-SF
69	30/5/1.11/CFM-SF
70	30/6/2000/CFM
71	30/7
72	30/8/150/CFM
73	30/9///600/CFM
74	31/3/1/44/8.5//198/PRORATED
75	SYSTEM - 1
76	39/1/COMBINED ECOS
77	40/1/SZ
78	41/1/2/2/4/4
79	42/1/.15
80	45/1/CBGHCLG/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF/OFF
81	40/2/RAD
82	41/2/2/3
83	42/2
84	45/2/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
85	40/3/UH
86	41/3/1/1/5/5
87	42/3///.1/////125
88	45/3/OFF/OFF/OFF/OFF/OFF/CBGHHTG/OFF/OFF/OFF/OFF
89	EQUIPMENT - 1
90	59/1/CARLISLE///COMBINED ECOS
91	60/1/1/PKPLANT/1/1
92	62/1/EQ1161/3/39/MBH
93	65/1/1//2/3
94	67/1/EQ2005/1/.17/HP
95	69/1/EQ4003
96	69/2
97	69/3

*Building 901*

*Trace Output File*

933702

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*****
*****
**
**          T R A C E   6 0 0   A N A L Y S I S          **
**
**          by          **
**
*****
*****
```

ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 901

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 11:27: 9 1/17/94  
Dataset Name: CB901 .TM



AIRFLOW - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	SZ	0	3,248	3,357	4,765	1,408	0	0
2	RAD	0	0	0	0	1,718	0	0
3	UH	0	0	3,201	0	1,119	0	0
Totals		0	3,248	6,558	4,765	4,246	0	0

CAPACITY - ALTERNATIVE 1  
BASE BUILDING

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

		Cooling				Heating						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
System Number	System Type	Capacity (Tons)	Capacity (Tons)	Capacity (Tons)	Totals (Tons)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Totals (Btuh)
1	SZ	8.8	0.0	0.0	8.8	-200,649	0	0	0	0	0	-200,649
2	RAD	0.0	0.0	0.0	0.0	-197,443	0	0	0	0	0	-197,443
3	UH	0.0	0.0	0.0	0.0	-103,545	0	0	0	0	0	-103,545
Totals		8.8	0.0	0.0	8.8	-501,637	0	0	0	0	0	-501,637

The building peaked at hour 14 month 7 with a capacity of 8.8 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
BASE BUILDING

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.33	367.3	276.2	43.45	1.37	-82.17	2,442
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-64.27	3,072
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.22	-39.54	2,619

Peaked at Time ==>	Mo/Hr: 7/14	*	Mo/Hr: 7/15	*	Mo/Hr: 13/ 1
Outside Air ==>	OADB/WB/HR: 91/ 74/105.0	*	OADB: 91	*	OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	6,983	0		6,983	6.58	*	11,443	15.38	*	-14,585	-14,585	7.34
Glass Solar	11,853	0		11,853	11.17	*	14,618	19.64	*	0	0	0.00
Glass Cond	4,849	0		4,849	4.57	*	4,960	6.67	*	-24,753	-24,753	12.47
Wall Cond	6,730	27		6,756	6.37	*	10,410	13.99	*	-20,341	-20,455	10.30
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	59,314			59,314	55.90	*	22,158	29.77	*	-98,085	-98,085	49.40
Sub Total==>	89,728	27		89,755	84.59	*	63,590	85.45	*	-157,763	-157,877	79.51
Internal Loads						*			*			
Lights	11,334	0		11,334	10.68	*	8,954	12.03	*	0	0	0.00
People	4,560			4,560	4.30	*	1,791	2.41	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,893	0	0	15,893	14.98	*	10,745	14.44	*	0	0	0.00
Ceiling Load	222	-222		0	0.00	*	93	0.13	*	-453	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				462	0.44	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-6			-6	-0.01	*	-6	-0.01	*	-40,690	-40,690	20.49
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
						*			*			
Grand Total==>	105,837	-195	0	106,103	100.00	*	74,422	100.00	*	-198,906	-198,567	100.00

COOLING COIL SELECTION										AREAS			
	Total Capacity		Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains			
Main Clg	8.8	106.1	68.1	3,248	75.2	63.1	69.0	53.8	51.8	55.5	Floor	2,442	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Totals	8.8	106.1									Roof	1,912	0 0
											Wall	1,489	404 27

-----HEATING COIL SELECTION-----					-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	1.33	SADB	53.9	122.5
Main Htg	-200.6	3,357	67.5	122.5	Infil	1,408	1,408	Clg Cfm/Ton	367.32	Plenum	76.8	64.3
Aux Htg	0.0	0	0.0	0.0	Supply	3,248	3,357	Clg Sqft/Ton	276.18	Return	75.2	67.5
Preheat	-0.0	3,248	67.5	53.8	Mincfm	0	0	Clg Btuh/Sqft	43.45	Ret/OA	75.2	67.5
Reheat	0.0	0	0.0	0.0	Return	3,248	3,357	No. People	8	Runarnd	75.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/Sqft	1.37	Fn BldTD	0.0	0.0
Total	-200.6				Auxil	0	0	Htg Btuh/Sqft	-82.17	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-17,425	-17,425	8.83
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-27,600	-27,600	13.98
Wall Cond	0	0		0	0.00	*	0	0.00	*	-32,718	-32,756	16.59
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-119,663	-119,663	60.61
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-197,406	-197,443	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,443	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-202,849	-197,443	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	3,072	
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	Roof	2,687	0 0
Totals	0.0	0.0								Wall	2,177	457 21

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	--ENGINEERING CHECKS--		--TEMPERATURES (F)--		
								Clg % OA	0.0	Type	Clg	Htg
Main Htg	-197.4	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,718	Clg Cfm/Ton	0.00	Plenum	0.0	23.8
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-197.4				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-64.27	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/0 \* Mo/Hr: 0/0 \* Mo/Hr: 13/1  
Outside Air ==> OADB/WB/HR: 0/0/0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Solar	0	0		0	0.00	*	0	0.00	*	-3,002	-3,002	2.90
Glass Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Wall Cond	0	0		0	0.00	*	0	0.00	*	-2,402	-2,402	2.32
Partition	0			0	0.00	*	0	0.00	*	-20,183	-20,183	19.49
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-77,958	-77,958	75.29
Internal Loads						*	0	0.00	*	-103,545	-103,545	100.00
Lights	0	0		0	0.00	*			*			
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*			*	0	0	0.00
Ret. Fan Heat		0		0	0.00	*			*		0	0.00
Duct Heat Pkup		0		0	0.00	*			*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*			*	0	0	0.00
Terminal Bypass		0	0	0	0.00	*			*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-103,545	-103,545	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	AREAS Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	2,619		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	374		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	0.0	0.0				Roof	1,169	0 0
						Wall	1,043	45 4

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	AIRFLOWS (cfm) Cooling Heating	--ENGINEERING CHECKS-- Clg % OA Clg Cfm/Sqft Clg Cfm/Ton Clg Sqft/Ton Clg Btuh/Sqft No. People Htg % OA Htg Cfm/Sqft Htg Btuh/Sqft	--TEMPERATURES (F)--- Type Clg Htg SADB 0.0 97.7 Plenum 0.0 68.0 Return 0.0 68.0 Ret/OA 0.0 68.0 Runarnd 0.0 68.0 Fn MtrTD 0.0 0.0 Fn BldTD 0.0 0.0 Fn Frict 0.0 0.0
Main Htg	-103.5	3,201	68.0	97.7	Vent	0 0	0.0	
Aux Htg	0.0	0	0.0	0.0	Infil	0 1,119	0.00	
Preheat	0.0	0	0.0	0.0	Supply	0 3,201	0.00	
Reheat	0.0	0	0.0	0.0	Mincfm	0 0	0.00	
Humidif	0.0	0	0.0	0.0	Return	0 3,201	0.00	
Opt Vent	0.0	0	0.0	0.0	Exhaust	0 0	0.00	
Total	-103.5				Rm Exh	0 0	1.22	
					Auxil	0 0	-39.54	

BUILDING U-VALUES - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.268	0.317	21.3	4.27
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.288	0.000	44.8	9.15
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.956	0.995	0.300	0.000	39.4	11.59
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	37.7	9.72
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	36.3	9.30
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.268	0.317	21.3	4.27
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.288	0.000	44.8	9.15
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.956	0.995	0.300	0.000	39.4	11.59
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	37.7	9.72
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.057	0.810	0.837	0.304	0.000	53.0	11.38
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.810	0.837	0.304	0.000	53.0	11.38
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.101	0.908	0.943	0.298	0.317	41.6	10.13
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.304	0.000	36.7	7.35
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.331	0.000	43.2	8.83
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.810	0.837	0.304	0.000	39.3	7.86
Zone	1 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.316	0.000	40.1	8.10
9	STAIRS	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
Zone	5 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
System	3 Total/Ave.	0.275	0.000	0.000	0.000	0.040	0.810	0.837	0.316	0.000	38.9	7.91
Building		0.275	0.000	0.000	0.000	0.095	0.909	0.944	0.302	0.317	39.1	9.17

BUILDING AREAS - ALTERNATIVE 1  
BASE BUILDING

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Min /Wl (%)	Net Wall Area (sqft)
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
8	OFFICE	1	1	145	145	0	0	0	0	0	0	0	0
Zone	4 Total/Ave.				145	0	0	0	0	0	0	0	0
System	1 Total/Ave.				2,442	0	0	0	0	1,912	404	27	1,085
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	0	775	53	8	635
Zone	3 Total/Ave.				775	0	0	0	0	775	53	8	635
System	2 Total/Ave.				3,072	0	0	0	0	2,687	457	21	1,720
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	0	14	3	454
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	0	1,000	17	4	431
3	LOCKER ROOM	1	1	714	714	374	0	0	0	0	14	11	114
Zone	1 Total/Ave.				2,450	374	0	0	0	1,000	45	4	998
9	STAIRS	1	1	169	169	0	0	0	0	169	0	0	0
Zone	5 Total/Ave.				169	0	0	0	0	169	0	0	0
System	3 Total/Ave.				2,619	374	0	0	0	1,169	45	4	998
Building					8,133	374	0	0	0	5,768	906	19	3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
BASE BUILDING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.095 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.419 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.240 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.77 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 31.23 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
BASE BUILDING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.4	68	1,344	-25,082	11	306	327.9	0	0	0.0	0	0
5 - 10	0.9	2	31	-50,164	24	654	655.8	0	0	0.0	0	0
10 - 15	1.3	1	15	-75,246	23	631	983.7	0	0	0.0	0	0
15 - 20	1.8	1	15	-100,327	8	217	1,311.5	0	0	0.0	0	0
20 - 25	2.2	0	0	-125,409	8	219	1,639.4	0	0	0.0	0	0
25 - 30	2.7	0	0	-150,491	3	89	1,967.3	0	0	0.0	0	0
30 - 35	3.1	2	43	-175,573	2	44	2,295.2	0	0	0.0	0	0
35 - 40	3.5	3	61	-200,655	1	31	2,623.1	0	0	0.0	0	0
40 - 45	4.0	6	111	-225,737	2	45	2,951.0	0	0	0.0	0	0
45 - 50	4.4	8	152	-250,819	2	59	3,278.9	81	5,748	0.0	0	0
50 - 55	4.9	0	0	-275,901	1	30	3,606.7	19	1,329	0.0	0	0
55 - 60	5.3	8	155	-300,982	14	392	3,934.6	0	0	0.0	0	0
60 - 65	5.7	3	62	-326,064	0	0	4,262.5	0	0	0.0	0	0
65 - 70	6.2	0	0	-351,146	0	0	4,590.4	0	0	0.0	0	0
70 - 75	6.6	0	0	-376,228	0	0	4,918.3	0	0	0.0	0	0
75 - 80	7.1	0	0	-401,310	0	0	5,246.2	0	0	0.0	0	0
80 - 85	7.5	0	0	-426,392	0	0	5,574.1	0	0	0.0	0	0
85 - 90	8.0	0	0	-451,474	0	0	5,901.9	0	0	0.0	0	0
90 - 95	8.4	0	0	-476,556	0	0	6,229.8	0	0	0.0	0	0
95 - 100	8.8	0	0	-501,637	0	0	6,557.7	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,043	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
BASE BUILDING

----- BUILDING TEMPERATURE PROFILES -----

Temperature	----- Zone Number -----					
Range	2	4	2	3	1	5
(F)						

Max. Temp.	81.8	316.5	102.7	99.8	101.3	141.3
Mo./Hr.	7 24	12 24	7 22	7 21	8 19	8 19
Day Type	1	5	1	1	1	1

	..... Number of Hours .....					
Above 100	0	8,052	160	0	280	3,089
95 - 100	0	28	1,034	812	1,454	99
90 - 95	0	116	1,054	1,226	1,036	196
85 - 90	0	104	741	761	403	90
80 - 85	76	205	593	703	337	198
75 - 80	2,464	136	90	170	162	0
70 - 75	814	119	0	0	0	0
65 - 70	318	0	2,232	2,439	2,581	5,088
60 - 65	386	0	1,095	1,268	1,669	0
55 - 60	920	0	678	727	692	0
50 - 55	683	0	1,083	654	146	0
Below 50	3,099	0	0	0	0	0

Min. Temp.	30.5	68.0	54.9	54.9	54.9	67.3
Mo./Hr.	2 9	1 1	4 7	1 8	2 6	1 6
Day Type	5	1	1	2	2	1



MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
BASE BUILDING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	OIL
	Off Peak (kWh)	On Peak (kW)	
Jan	3,148	10	774
Feb	2,880	10	796
March	2,985	10	495
April	2,693	10	248
May	4,250	17	0
June	4,902	18	0
July	6,205	18	0
Aug	5,075	18	0
Sept	4,113	17	0
Oct	2,701	10	189
Nov	2,792	10	335
Dec	3,107	10	624
Total	44,852	18	3,461

Building Energy Consumption = 61,380 (Btu/Sq Ft/Year)  
Source Energy Consumption = 101,270 (Btu/Sq Ft/Year)

Floor Area = 8,133 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

[illegible]

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1  
 BASE BUILDING

	ELEC	89	85	68	41	0	0	0	0	0	31	53	84	452
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1	EQ5240	BOILER FORCED DRAFT FAN												
	ELEC	159	152	121	72	0	0	0	0	0	56	95	149	804
	PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3
1	EQ5307	BOILER CONTROLS												
	ELEC	263	252	201	120	0	0	0	0	0	93	158	248	1,336
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1	EQ5040	FUEL OIL PUMP C.V.												
	ELEC	178	170	136	81	0	0	0	0	0	63	107	168	903
	PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
BASE BUILDING

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        17.7    (kW)  
Yearly Time of Peak 15 (hr)    7 (mo)

Hour 15    Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

	Lights		12.2	68.89
	Base Utilities		0.0	0.00
	Misc Equipment		0.0	0.00
Sub Total			12.2	68.89
Grand Total			17.7	100.00

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**          T R A C E   6 0 0   A N A L Y S I S          **
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**          by          **
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 901

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 11:40:24 1/17/94  
Dataset Name: CB901 .TM

AIRFLOW - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	SZ	0	3,248	3,248	4,524	1,276	0	0
2	RAD	0	0	0	0	1,558	0	0
3	UH	0	0	3,201	0	1,014	0	0
Totals		0	3,248	6,449	4,524	3,848	0	0

CAPACITY - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling					Heating					
		Main Sys. Capacity (Tons)	Aux. Sys. Capacity (Tons)	Opt. Vent Capacity (Tons)	Cooling Totals (Tons)	Main Sys. Capacity (Btuh)	Aux. Sys. Capacity (Btuh)	Preheat Capacity (Btuh)	Reheat Capacity (Btuh)	Humidif. Capacity (Btuh)	Opt. Vent Capacity (Btuh)	Heating Totals (Btuh)
1	SZ	6.4	0.0	0.0	6.4	-157,799	0	0	0	0	0	-157,799
2	RAD	0.0	0.0	0.0	0.0	-148,594	0	0	0	0	0	-148,594
3	UH	0.0	0.0	0.0	0.0	-86,922	0	0	0	0	0	-86,922
Totals		6.4	0.0	0.0	6.4	-393,316	0	0	0	0	0	-393,316

The building peaked at hour 14 month 7 with a capacity of 6.4 tons

ENGINEERING CHECKS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.33	503.6	378.7	31.69	1.33	-64.62	2,442
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-48.37	3,072
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.22	-33.19	2,619

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14					*	Mo/Hr: 7/15					*	Mo/Hr: 13/ 1				
Outside Air ==> OADB/WB/HR: 91/ 74/105.0					*	OADB: 91					*	OADB: 4				
					*						*					*
	Space	Ret. Air	Ret. Air	Net	Perct	*	Space	Perct	*	Space Peak	Coil Peak	Perct				
	Sens.+Lat.	Sensible	Latent	Total	Of Tot	*	Sensible	Of Tot	*	Space Sens	Tot Sens	Of Tot				
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)	*	(Btuh)	(%)	*	(Btuh)	(Btuh)	(%)				
Envelope Loads						*			*							
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00				
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00				
Roof Cond	1,640	0		1,640	2.12	*	1,994	3.49	*	-4,646	-4,646	2.96				
Glass Solar	11,853	0		11,853	15.32	*	13,082	22.92	*	0	0	0.00				
Glass Cond	4,849	0		4,849	6.27	*	5,137	9.00	*	-24,753	-24,753	15.76				
Wall Cond	887	6		893	1.15	*	1,059	1.85	*	-3,889	-3,914	2.49				
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00				
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00				
Infiltration	41,794			41,794	54.01	*	22,217	38.92	*	-88,867	-88,867	56.58				
Sub Total==>	61,023	6		61,029	78.87	*	43,488	76.19	*	-122,155	-122,180	77.79				
Internal Loads						*			*							
Lights	11,334	0		11,334	14.65	*	11,431	20.03	*	0	0	0.00				
People	4,560			4,560	5.89	*	2,141	3.75	*	0	0	0.00				
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00				
Sub Total==>	15,893	0	0	15,893	20.54	*	13,573	23.78	*	0	0	0.00				
Ceiling Load	54	-54		0	0.00	*	21	0.04	*	-154	0	0.00				
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00				
Sup. Fan Heat				462	0.60	*		0.00	*		0	0.00				
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00				
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00				
OV/UNDR Sizing	0			0	-0.00	*	0	-0.00	*	-34,885	-34,885	22.21				
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00				
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00				
						*			*							
Grand Total==>	76,971	-49	0	77,384	100.00	*	57,082	100.00	*	-157,194	-157,064	100.00				

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	6.4	77.4	3,248	75.1	65.6	82.1	58.7	58.1	73.4	Part	0	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	1,912	0 0
Totals	6.4	77.4								Wall	1,489	404 27

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	ENGINEERING CHECKS--		TEMPERATURES (F)---		
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg % OA	0.0	Type	Clg	Htg
Main Htg	-157.8	3,248	67.8	112.5	Infil	1,276	1,276	Clg Cfm/Sqft	1.33	SADB	58.8	112.5
Aux Htg	0.0	0	0.0	0.0	Supply	3,248	3,248	Clg Cfm/Ton	503.64	Plenum	75.4	66.7
Preheat	-0.0	3,248	67.8	58.7	Mincfm	0	0	Clg Sqft/Ton	378.68	Return	75.1	67.8
Reheat	0.0	0	0.0	0.0	Return	3,248	3,248	Clg Btuh/Sqft	31.69	Ret/OA	75.1	67.8
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	8	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-157.8				Auxil	0	0	Htg Cfm/Sqft	1.33	Fn BldTD	0.0	0.0
								Htg Btuh/Sqft	-64.62	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Percent Of Tot (%)	*	Space Sensible (Btuh)	Percent Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Percent Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-6,257	-6,257	4.21
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-27,600	-27,600	18.57
Wall Cond	0	0		0	0.00	*	0	0.00	*	-6,197	-6,211	4.18
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-108,527	-108,527	73.04
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-148,580	-148,594	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-3,497	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-152,078	-148,594	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	2,687	0 0
Totals	0.0	0.0				Wall	2,177	457 21

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-148.6	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,558	Clg Cfm/Ton	0.00	Plenum	0.0	39.6
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-148.6				Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-48.37	Fn Frict	0.0	0.0

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----



System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-2,734	-2,734	3.14
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-2,402	-2,402	2.76
Wall Cond	0	0		0	0.00	*	0	0.00	*	-11,197	-11,197	12.88
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-70,589	-70,589	81.21
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-86,922	-86,922	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-86,922	-86,922	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	2,619	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	374	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	1,169	0 0
Totals	0.0	0.0				Wall	1,043	45 4

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-86.9	3,201	68.0	93.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	93.0
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,014	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	3,201	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	3,201	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-86.9				Rm Exh	0	0	Htg Cfm/Sqft	1.22	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-33.19	Fn Frict	0.0	0.0

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceill.		
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.055	0.317	21.8	4.37
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.056	0.000	45.9	9.38
6	LOUNGE	0.000	0.000	0.000	0.000	0.038	0.956	0.995	0.057	0.000	42.7	12.41
Zone 2	Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	40.0	10.26
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System 1	Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	38.4	9.81
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.055	0.317	21.8	4.37
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.056	0.000	45.9	9.38
6	LOUNGE	0.000	0.000	0.000	0.000	0.038	0.956	0.995	0.057	0.000	42.7	12.41
Zone 2	Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	40.0	10.26
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.057	0.000	55.7	11.91
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.057	0.000	55.7	11.91
System 2	Total/Ave.	0.000	0.000	0.000	0.000	0.036	0.908	0.943	0.057	0.317	44.0	10.67
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.057	0.000	38.2	7.65
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.331	0.000	43.2	8.83
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.810	0.837	0.057	0.000	39.7	7.93
Zone 1	Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.175	0.000	40.7	8.21
9	STAIRS	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	22.5	5.28
Zone 5	Total/Ave.	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	22.5	5.28
System 3	Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.175	0.000	39.5	8.03
Building		0.275	0.000	0.000	0.000	0.037	0.909	0.944	0.088	0.317	40.9	9.56

BUILDING AREAS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
8	OFFICE	1	1	145	145	0	0	0	0	0	0	0	0
Zone	4 Total/Ave.				145	0	0	0	0	0	0	0	0
System	1 Total/Ave.				2,442	0	0	0	0	1,912	404	27	1,085
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	0	775	53	8	635
Zone	3 Total/Ave.				775	0	0	0	0	775	53	8	635
System	2 Total/Ave.				3,072	0	0	0	0	2,687	457	21	1,720
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	0	14	3	454
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	0	1,000	17	4	431
3	LOCKER ROOM	1	1	714	714	374	0	0	0	0	14	11	114
Zone	1 Total/Ave.				2,450	374	0	0	0	1,000	45	4	998
9	STAIRS	1	1	169	169	0	0	0	0	169	0	0	0
Zone	5 Total/Ave.				169	0	0	0	0	169	0	0	0
System	3 Total/Ave.				2,619	374	0	0	0	1,169	45	4	998
Building					8,133	374	0	0	0	5,768	906	19	3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.037 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.246 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.131 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.45 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 24.62 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.3	66	1,310	-19,666	12	303	322.4	0	0	0.0	0	0
5 - 10	0.6	1	15	-39,332	24	586	644.9	0	0	0.0	0	0
10 - 15	1.0	2	34	-58,997	22	549	967.3	0	0	0.0	0	0
15 - 20	1.3	1	15	-78,663	6	155	1,289.8	0	0	0.0	0	0
20 - 25	1.6	1	16	-98,329	3	63	1,612.2	0	0	0.0	0	0
25 - 30	1.9	1	15	-117,995	4	100	1,934.6	0	0	0.0	0	0
30 - 35	2.3	2	31	-137,660	4	87	2,257.1	0	0	0.0	0	0
35 - 40	2.6	1	15	-157,326	1	31	2,579.5	0	0	0.0	0	0
40 - 45	2.9	8	150	-176,992	2	60	2,902.0	0	0	0.0	0	0
45 - 50	3.2	5	109	-196,658	2	45	3,224.4	72	5,088	0.0	0	0
50 - 55	3.5	5	93	-216,324	4	95	3,546.8	28	1,989	0.0	0	0
55 - 60	3.9	3	62	-235,989	16	403	3,869.3	0	0	0.0	0	0
60 - 65	4.2	2	31	-255,655	0	0	4,191.7	0	0	0.0	0	0
65 - 70	4.5	5	93	-275,321	0	0	4,514.2	0	0	0.0	0	0
70 - 75	4.8	0	0	-294,987	0	0	4,836.6	0	0	0.0	0	0
75 - 80	5.2	0	0	-314,653	0	0	5,159.0	0	0	0.0	0	0
80 - 85	5.5	0	0	-334,318	0	0	5,481.5	0	0	0.0	0	0
85 - 90	5.8	0	0	-353,984	0	0	5,803.9	0	0	0.0	0	0
90 - 95	6.1	0	0	-373,650	0	0	6,126.4	0	0	0.0	0	0
95 - 100	6.4	0	0	-393,316	0	0	6,448.8	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,283	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature Range (F)	----- Zone Number -----					
	2	4	2	3	1	5
Max. Temp.	80.4	316.5	106.1	111.2	104.9	166.5
Mo./Hr.	7 23	12 24	8 19	8 19	8 19	9 19
Day Type	1	5	1	1	1	1
	..... Number of Hours .....					
Above 100	0	8,052	1,296	2,388	1,404	3,125
95 - 100	0	28	1,205	540	1,368	67
90 - 95	0	116	418	40	248	156
85 - 90	0	104	255	184	176	108
80 - 85	15	205	282	250	278	216
75 - 80	2,794	136	216	304	198	0
70 - 75	837	119	0	289	0	0
65 - 70	26	0	2,252	2,310	2,777	5,088
60 - 65	401	0	1,240	1,384	1,771	0
55 - 60	956	0	753	803	540	0
50 - 55	693	0	843	268	0	0
Below 50	3,038	0	0	0	0	0
Min. Temp.	31.2	68.0	54.9	55.0	57.2	67.6
Mo./Hr.	2 8	1 1	1 24	1 5	2 7	1 6
Day Type	5	1	1	2	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	OIL (Therm)
Jan	3,038	10	596
Feb	2,777	10	609
March	2,893	10	401
April	2,624	10	197
May	4,247	17	0
June	4,690	18	0
July	5,804	18	0
Aug	4,865	18	0
Sept	4,110	17	0
Oct	2,639	10	131
Nov	2,678	10	264
Dec	2,985	10	491
Total	43,350	18	2,689

Building Energy Consumption = 51,257 (Btu/Sq Ft/Year)  
Source Energy Consumption = 89,386 (Btu/Sq Ft/Year)

Floor Area = 8,133 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

[illegible]

	ELEC	84	80	63	35	0	0	0	0	26	43	76	408
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1	EQ5240	BOILER FORCED DRAFT FAN											
	ELEC	117	112	88	49	0	0	0	0	37	60	106	569
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1	EQ5307	BOILER CONTROLS											
	ELEC	248	238	186	105	0	0	0	0	78	128	226	1,208
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1	EQ5040	FUEL OIL PUMP C.V.											
	ELEC	131	126	98	56	0	0	0	0	41	68	119	639
	PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3



UTILITY PEAK CHECKSUMS - ALTERNATIVE 2  
WALL & ROOF INSULATION

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 17.7 (kW)  
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

Lights			12.2	68.89
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			12.2	68.89
Grand Total			17.7	100.00

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**          T R A C E   6 0 0   A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 901

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 11:53:51 1/17/94  
Dataset Name: CB901.TM

AIRFLOW - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	----- Main -----					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	SZ	0	3,248	3,248	4,427	1,179	0	0
2	RAD	0	0	0	0	1,441	0	0
3	UH	0	0	3,201	0	936	0	0
Totals		0	3,248	6,449	4,427	3,557	0	0

CAPACITY - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	----- Cooling -----				----- Heating -----						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
		Capacity (Tons)	Capacity (Tons)	Capacity (Tons)	Totals (Tons)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Totals (Btuh)
1	SZ	7.2	0.0	0.0	7.2	-162,044	0	0	0	0	0	-162,044
2	RAD	0.0	0.0	0.0	0.0	-159,424	0	0	0	0	0	-159,424
3	UH	0.0	0.0	0.0	0.0	-89,278	0	0	0	0	0	-89,278
Totals		7.2	0.0	0.0	7.2	-410,745	0	0	0	0	0	-410,745

The building peaked at hour 15 month 7 with a capacity of 7.2 tons

ENGINEERING CHECKS - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	----- Cooling -----				--- Heating ---		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.33	451.3	339.3	35.36	1.33	-66.36	2,442
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-51.90	3,072
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.22	-34.09	2,619

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/15 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Percnt		Space	Percnt		Space Peak	Coil Peak	Percnt
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	6,983	0		6,983	8.09	*	11,443	17.95	*	-14,585	-14,585	9.12
Glass Solar	8,427	0		8,427	9.76	*	10,885	17.07	*	0	0	0.00
Glass Cond	1,580	0		1,580	1.83	*	1,618	2.54	*	-7,855	-7,855	4.91
Wall Cond	6,730	27		6,756	7.82	*	10,410	16.33	*	-20,341	-20,455	12.79
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	46,260			46,260	53.57	*	18,558	29.11	*	-82,135	-82,135	51.37
Sub Total==>	69,979	27		70,005	81.07	*	52,914	82.99	*	-124,916	-125,029	78.19
Internal Loads												
Lights	11,334	0		11,334	13.12	*	8,954	14.04	*	0	0	0.00
People	4,560			4,560	5.28	*	1,791	2.81	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,893	0	0	15,893	18.40	*	10,745	16.85	*	0	0	0.00
Ceiling Load	222	-222		0	0.00	*	108	0.17	*	-467	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				462	0.53	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-6			-6	-0.01	*	-6	-0.01	*	-34,866	-34,866	21.81
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	86,088	-195	0	86,354	100.00	*	63,760	100.00	*	-160,248	-159,895	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	7.2	86.4	3,248	75.2	63.9	73.1	56.8	55.1	63.6	2,442		
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0		
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0		
Totals	7.2	86.4								1,912	0	0
										1,489	404	27

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	ENGINEERING CHECKS--			TEMPERATURES (F)---		
	(Mbh)	(cfm)	Deg F	Deg F				Clg % OA	0.0		Type	Clg	Htg
Main Htg	-162.0	3,248	67.5	113.3	Vent	0	0	Clg Cfm/Sqft	1.33		SADB	57.0	113.3
Aux Htg	0.0	0	0.0	0.0	Infil	1,179	1,179	Clg Cfm/Ton	451.32		Plenum	76.8	64.2
Preheat	-0.0	3,248	67.5	56.8	Supply	3,248	3,248	Clg Sqft/Ton	339.35		Return	75.2	67.5
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	35.36		Ret/OA	75.2	67.5
Humidif	0.0	0	0.0	0.0	Return	3,248	3,248	No. People	8		Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0		Fn MtrTD	0.0	0.0
Total	-162.0				Rm Exh	0	0	Htg Cfm/SqFt	1.33		Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-66.36		Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-17,425	-17,425	10.93
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-8,887	-8,887	5.57
Wall Cond	0	0		0	0.00	*	0	0.00	*	-32,718	-32,756	20.55
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-100,356	-100,356	62.95
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-159,387	-159,424	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,443	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-164,830	-159,424	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%) Part ExFlr Roof Wall
Main Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	3,072	0 0 0
Aux Clg	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0	0 0 0
Opt Vent	0.0	0.0	0.0	0.0 0.0 0.0	0.0 0.0 0.0	0	0 0 0
Totals	0.0	0.0				2,687	457 21

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-159.4	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,441	Clg Cfm/Ton	0.00	Plenum	0.0	23.8
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-159.4				Rm Exh	0	0	Htg Cfm/Sqft	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-51.90	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-3,002	-3,002	3.36
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-871	-871	0.98
Wall Cond	0	0		0	0.00	*	0	0.00	*	-20,183	-20,183	22.61
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-65,222	-65,222	73.06
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-89,278	-89,278	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-89,278	-89,278	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Floor	2,619	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	374	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Totals	0.0	0.0				Roof	1,169	0 0
						Wall	1,043	45 4

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-89.3	3,201	68.0	93.6	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	93.6
Aux Htg	0.0	0	0.0	0.0	Infil	0	936	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	3,201	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	3,201	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-89.3				Rm Exh	0	0	Htg Cfm/SqFt	1.22	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-34.09	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.300	0.304	0.268	0.317	21.3	4.27
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.300	0.304	0.288	0.000	44.8	9.15
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.300	0.304	0.300	0.000	39.4	11.59
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.300	0.304	0.295	0.317	37.7	9.72
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.300	0.304	0.295	0.317	36.3	9.30
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.300	0.304	0.268	0.317	21.3	4.27
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.300	0.304	0.288	0.000	44.8	9.15
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.300	0.304	0.300	0.000	39.4	11.59
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.300	0.304	0.295	0.317	37.7	9.72
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.057	0.300	0.304	0.304	0.000	53.0	11.38
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.300	0.304	0.304	0.000	53.0	11.38
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.101	0.300	0.304	0.298	0.317	41.6	10.13
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.300	0.304	0.304	0.000	36.7	7.35
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.300	0.304	0.331	0.000	43.2	8.83
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.300	0.304	0.304	0.000	39.3	7.86
Zone	1 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.300	0.304	0.316	0.000	40.1	8.10
9	STAIRS	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
Zone	5 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
System	3 Total/Ave.	0.275	0.000	0.000	0.000	0.040	0.300	0.304	0.316	0.000	38.9	7.91
Building		0.275	0.000	0.000	0.000	0.095	0.300	0.304	0.302	0.317	39.1	9.17

BUILDING AREAS - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate		Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
8	OFFICE	1	1	145	145	0	0	0	0	0	0	0	0
Zone	4 Total/Ave.				145	0	0	0	0	0	0	0	0
System	1 Total/Ave.				2,442	0	0	0	0	1,912	404	27	1,085
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	0	775	53	8	635
Zone	3 Total/Ave.				775	0	0	0	0	775	53	8	635
System	2 Total/Ave.				3,072	0	0	0	0	2,687	457	21	1,720
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	0	14	3	454
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	0	1,000	17	4	431
3	LOCKER ROOM	1	1	714	714	374	0	0	0	0	14	11	114
Zone	1 Total/Ave.				2,450	374	0	0	0	1,000	45	4	998
9	STAIRS	1	1	169	169	0	0	0	0	169	0	0	0
Zone	5 Total/Ave.				169	0	0	0	0	169	0	0	0
System	3 Total/Ave.				2,619	374	0	0	0	1,169	45	4	998
Building					8,133	374	0	0	0	5,768	906	19	3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.095 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.302 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.188 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.77 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 23.77 (Btu/Hr/Sq Ft)



SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.4	58	1,159	-20,537	14	330	322.4	0	0	0.0	0	0
5 - 10	0.7	3	60	-41,075	19	463	644.9	0	0	0.0	0	0
10 - 15	1.1	2	49	-61,612	26	630	967.3	0	0	0.0	0	0
15 - 20	1.4	3	54	-82,149	5	119	1,289.8	0	0	0.0	0	0
20 - 25	1.8	2	31	-102,686	4	87	1,612.2	0	0	0.0	0	0
25 - 30	2.2	2	37	-123,224	4	106	1,934.6	0	0	0.0	0	0
30 - 35	2.5	2	31	-143,761	2	59	2,257.1	0	0	0.0	0	0
35 - 40	2.9	0	0	-164,298	2	44	2,579.5	0	0	0.0	0	0
40 - 45	3.2	3	61	-184,835	1	31	2,902.0	0	0	0.0	0	0
45 - 50	3.6	12	229	-205,373	1	31	3,224.4	72	5,088	0.0	0	0
50 - 55	4.0	3	61	-225,910	3	61	3,546.8	28	1,989	0.0	0	0
55 - 60	4.3	3	62	-246,447	2	59	3,869.3	0	0	0.0	0	0
60 - 65	4.7	6	124	-266,985	15	361	4,191.7	0	0	0.0	0	0
65 - 70	5.0	2	31	-287,522	0	0	4,514.2	0	0	0.0	0	0
70 - 75	5.4	0	0	-308,059	0	0	4,836.6	0	0	0.0	0	0
75 - 80	5.8	0	0	-328,596	0	0	5,159.0	0	0	0.0	0	0
80 - 85	6.1	0	0	-349,134	0	0	5,481.5	0	0	0.0	0	0
85 - 90	6.5	0	0	-369,671	0	0	5,803.9	0	0	0.0	0	0
90 - 95	6.8	0	0	-390,208	0	0	6,126.4	0	0	0.0	0	0
95 - 100	7.2	0	0	-410,745	0	0	6,448.8	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,379	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----					
Range	2	4	2	3	1	5
(F)						

Max. Temp.	81.7	316.5	108.3	101.2	102.2	141.3
Mo./Hr.	7	24	12	24	8	21
Day Type	1	5	1	1	1	1

	..... Number of Hours .....					
Above 100	0	8,052	1,698	90	438	3,089
95 - 100	0	28	954	1,113	1,496	99
90 - 95	0	116	364	1,249	948	196
85 - 90	0	104	352	526	346	90
80 - 85	91	205	304	568	318	198
75 - 80	2,836	136	0	126	126	0
70 - 75	745	119	0	34	0	0
65 - 70	34	0	2,481	2,560	2,810	5,088
60 - 65	713	0	1,106	1,313	1,707	0
55 - 60	859	0	705	696	571	0
50 - 55	619	0	796	485	0	0
Below 50	2,863	0	0	0	0	0

Min. Temp.	32.3	68.0	54.9	55.0	57.2	67.3
Mo./Hr.	2	9	1	1	1	6
Day Type	5	1	1	1	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	OIL
	Off Peak (kWh)	On Peak (kW)	
Jan	3,035	10	600
Feb	2,757	10	600
March	2,844	10	387
April	2,630	10	185
May	4,274	17	0
June	4,869	18	0
July	6,041	18	0
Aug	5,051	18	0
Sept	4,155	17	0
Oct	2,644	10	130
Nov	2,630	10	261
Dec	2,998	10	495
Total	43,928	18	2,658

Building Energy Consumption = 51,110 (Btu/Sq Ft/Year)  
Source Energy Consumption = 89,704 (Btu/Sq Ft/Year)

Floor Area = 8,133 (Sq Ft)

## EQUIPMENT ENERGY CONSUMPTION

Ref Num	Equip Code	Monthly Consumption												Total
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	
0	LIGHTS													
	ELEC	2458	2220	2458	2379	3971	3843	3971	3971	3843	2458	2379	2458	36,409
	PK	9.1	9.1	9.1	9.1	12.2	12.2	12.2	12.2	12.2	9.1	9.1	9.1	12.2
1	MISC LD													
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	MISC LD													
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	MISC LD													
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	MISC LD													
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	MISC LD													
	P HOTH2O	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	MISC LD													
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	EQ1161													
		AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	64	718	1643	760	79	0	0	0	3,265
	PK	0.0	0.0	0.0	0.0	4.2	4.4	4.5	4.4	4.2	0.0	0.0	0.0	4.5
1	EQ5200													
		CONDENSER FANS												
	ELEC	0	0	0	0	6	74	166	78	8	0	0	0	331
	PK	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.4
1	EQ5303													
		CONTROLS												
	ELEC	0	0	0	0	121	126	149	130	117	0	0	0	643
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3
1	EQ4003													
		FC CENTRIF. FAN C.V.												
	ELEC	0	0	0	0	112	108	112	112	108	0	0	0	553
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 3  
 DOUBLE GLAZED WINDOWS

	ELEC	81	76	54	35	0	0	0	0	0	26	35	76	385
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1	EQ5240	BOILER FORCED DRAFT FAN												
	ELEC	120	111	80	52	0	0	0	0	0	39	52	112	567
	PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1	EQ5307	BOILER CONTROLS												
	ELEC	241	224	161	105	0	0	0	0	0	78	105	226	1,139
	PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1	EQ5040	FUEL OIL PUMP C.V.												
	ELEC	135	125	90	59	0	0	0	0	0	43	59	126	636
	PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3

UTILITY PEAK CHECKSUMS - ALTERNATIVE 3  
DOUBLE GLAZED WINDOWS

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility   ELECTRIC DEMAND

Peak Value        17.7    (kW)  
Yearly Time of Peak 15 (hr)    7 (mo)

Hour 15   Month   7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

Lights	12.2	68.89
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	12.2	68.89
Grand Total	17.7	100.00

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**          T R A C E    6 0 0    A N A L Y S I S          **
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 901

Weather File Code:	CARLISLE
Location:	ENERGY SAVINGS OPPORTUNITY STUDY
Latitude:	40.2 (deg)
Longitude:	77.2 (deg)
Time Zone:	5
Elevation:	475 (ft)
Barometric Pressure:	29.2 (in. Hg)
Summer Clearness Number:	1.00
Winter Clearness Number:	1.00
Summer Design Dry Bulb:	92 (F)
Summer Design Wet Bulb:	72 (F)
Winter Design Dry Bulb:	4 (F)
Summer Ground Relectance:	0.20
Winter Ground Relectance:	0.20
Air Density:	0.0742 (Lbm/cuft)
Air Specific Heat:	0.2444 (Btu/lbm/F)
Density-Specific Heat Prod:	1.0882 (Btu-min./hr/cuft/F)
Latent Heat Factor:	4,790.2 (Btu-min./hr/cuft)
Enthalpy Factor:	4.4519 (Lb-min./hr/cuft)
Design Simulation Period:	May To September
System Simulation Period:	January To December
Cooling Load Methodology:	CLTD/CLF (Transfer Function Method)
Time/Date Program was Run:	12: 7:27 1/17/94
Dataset Name:	C8901 .TM

AIRFLOW - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	SZ	0	3,248	3,248	4,183	935	0	0
2	RAD	0	0	0	0	1,142	0	0
3	UH	0	0	3,201	0	743	0	0
Totals		0	3,248	6,449	4,183	2,821	0	0

CAPACITY - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- S Y S T E M   S U M M A R Y -----  
(Design Capacity Quantities)

System Number	System Type	Cooling				Heating							
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating	
		Capacity (Tons)	Capacity (Tons)	Capacity (Tons)	Totals (Tons)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Capacity (Btuh)	Totals (Btuh)	
1	SZ	7.3	0.0	0.0	7.3	-160,656	0	0	0	0	0	0	-160,656
2	RAD	0.0	0.0	0.0	0.0	-157,314	0	0	0	0	0	0	-157,314
3	UH	0.0	0.0	0.0	0.0	-77,346	0	0	0	0	0	0	-77,346
Totals		7.3	0.0	0.0	7.3	-395,317	0	0	0	0	0	0	-395,317

The building peaked at hour 15 month 7 with a capacity of 7.3 tons

ENGINEERING CHECKS - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- E N G I N E E R I N G   C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.33	445.0	334.6	35.86	1.33	-65.79	2,442
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-51.21	3,072
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.22	-29.53	2,619



System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/15 \* Mo/Hr: 7/17 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 73/ 98.0 \* OADB: 89 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Percnt		Space	Percnt		Space Peak	Coil Peak	Percnt
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot		Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)		(Btuh)	(Btuh)	(%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	8,730	0		8,730	9.97	*	11,443	17.08	*	-14,585	-14,585	9.20
Glass Solar	13,082	0		13,082	14.94	*	14,618	21.82	*	0	0	0.00
Glass Cond	5,137	0		5,137	5.87	*	4,960	7.40	*	-24,753	-24,753	15.62
Wall Cond	8,189	26		8,215	9.38	*	10,410	15.54	*	-20,341	-20,455	12.90
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	35,860			35,860	40.95	*	14,718	21.97	*	-65,148	-65,148	41.10
Sub Total==>	70,998	26		71,024	81.10	*	56,150	83.82	*	-124,827	-124,940	78.82
Internal Loads												
Lights	11,498	0		11,498	13.13	*	8,954	13.37	*	0	0	0.00
People	4,597			4,597	5.25	*	1,791	2.67	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	16,095	0	0	16,095	18.38	*	10,745	16.04	*	0	0	0.00
Ceiling Load	277	-277		0	0.00	*	103	0.15	*	-467	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				462	0.53	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	-6			-6	-0.01	*	-6	-0.01	*	-33,568	-33,568	21.18
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	87,364	-252	0	87,574	100.00	*	66,992	100.00	*	-158,861	-158,508	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor		
Main Clg	7.3	87.6	3,248	75.3	63.0	68.6	55.9	53.8	60.0	2,442		
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Totals	7.3	87.6								Roof	1,912	0 0
										Wall	1,489	404 27

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	--ENGINEERING CHECKS--			--TEMPERATURES (F)---		
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg % OA	0.0	Type	Clg	Htg	
Main Htg	-160.7	3,248	67.5	113.0	Infil	935	935	Clg Cfm/Sqft	1.33	SADB	56.0	113.0	
Aux Htg	0.0	0	0.0	0.0	Supply	3,248	3,248	Clg Cfm/Ton	445.03	Plenum	77.2	64.2	
Preheat	-0.0	3,248	67.5	55.9	Mincfm	0	0	Clg Sqft/Ton	334.62	Return	75.3	67.5	
Reheat	0.0	0	0.0	0.0	Return	3,248	3,248	Clg Btuh/Sqft	35.86	Ret/OA	75.3	67.5	
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	No. People	8	Runarnd	75.0	68.0	
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0	
Total	-160.7				Auxil	0	0	Htg Cfm/Sqft	1.33	Fn BldTD	0.0	0.0	
								Htg Btuh/Sqft	-65.79	Fn Frict	0.1	0.0	

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-17,425	-17,425	11.08
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-27,600	-27,600	17.54
Wall Cond	0	0		0	0.00	*	0	0.00	*	-32,718	-32,756	20.82
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-79,534	-79,534	50.56
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-157,277	-157,314	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-5,443	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-162,720	-157,314	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Part	0	
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	Roof	2,687	0 0
Totals	0.0	0.0				Wall	2,177	457 21

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-157.3	0	0.0	0.0	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	1,142	Clg Cfm/Ton	0.00	Plenum	0.0	23.8
Preheat	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-157.3				Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-51.21	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space	Ret. Air	Ret. Air	Net	Perct		Space	Perct	Space Peak	Coil Peak	Perct
	Sens.+Lat.	Sensible	Latent	Total	Of Tot		Sensible	Of Tot	Space Sens	Tot Sens	Of Tot
	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)		(Btuh)	(%)	(Btuh)	(Btuh)	(%)
Envelope Loads											
Skylite Solr	0	0		0	0.00	*	0	0.00	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	-3,002	-3,002	3.88
Glass Solar	0	0		0	0.00	*	0	0.00	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	-2,402	-2,402	3.11
Wall Cond	0	0		0	0.00	*	0	0.00	-20,183	-20,183	26.09
Partition	0			0	0.00	*	0	0.00	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	-51,760	-51,760	66.92
Sub Total==>	0	0		0	0.00	*	0	0.00	-77,346	-77,346	100.00
Internal Loads											
Lights	0	0		0	0.00	*	0	0.00	0	0	0.00
People	0			0	0.00	*	0	0.00	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	-77,346	-77,346	100.00

-----COOLING COIL SELECTION-----

	Total Capacity	Sens Cap.	Coil Airfl	Entering DB/WB/HR	Leaving DB/WB/HR	Gross Total	Glass (sf)	(%)
	(Tons)	(Mbh)	(cfm)	Deg F Deg F Grains	Deg F Deg F Grains	Floor		
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	2,619		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	374		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	0.0	0.0				Roof	1,169	0 0
						Wall	1,043	45 4

-----HEATING COIL SELECTION-----

	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent			Clg Cfm/Sqft	0.00	SADB	0.0	90.2
Main Htg	-77.3	3,201	68.0	90.2	Infil	0	743	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Aux Htg	0.0	0	0.0	0.0	Supply	0	3,201	Clg Sqft/Ton	0.00	Return	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	3,201	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	1.22	Fn BldTD	0.0	0.0
Total	-77.3				Auxil	0	0	Htg Btuh/SqFt	-29.53	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----

BUILDING U-VALUES - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.268	0.317	21.3	4.27
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.288	0.000	44.8	9.15
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.956	0.995	0.300	0.000	39.4	11.59
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	37.7	9.72
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone	4 Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System	1 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	36.3	9.30
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.268	0.317	21.3	4.27
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.288	0.000	44.8	9.15
6	LOUNGE	0.000	0.000	0.000	0.000	0.157	0.956	0.995	0.300	0.000	39.4	11.59
Zone	2 Total/Ave.	0.000	0.000	0.000	0.000	0.119	0.921	0.957	0.295	0.317	37.7	9.72
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.057	0.810	0.837	0.304	0.000	53.0	11.38
Zone	3 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.810	0.837	0.304	0.000	53.0	11.38
System	2 Total/Ave.	0.000	0.000	0.000	0.000	0.101	0.908	0.943	0.298	0.317	41.6	10.13
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.304	0.000	36.7	7.35
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.331	0.000	43.2	8.83
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.810	0.837	0.304	0.000	39.3	7.86
Zone	1 Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.316	0.000	40.1	8.10
9	STAIRS	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
Zone	5 Total/Ave.	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	21.9	5.15
System	3 Total/Ave.	0.275	0.000	0.000	0.000	0.040	0.810	0.837	0.316	0.000	38.9	7.91
Building		0.275	0.000	0.000	0.000	0.095	0.909	0.944	0.302	0.317	39.1	9.17

BUILDING AREAS - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- B U I L D I N G   A R E A S -----

Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
8	OFFICE	1	1	145	145	0	0	0	0	0	0	0	0
Zone	4 Total/Ave.				145	0	0	0	0	0	0	0	0
System	1 Total/Ave.				2,442	0	0	0	0	1,912	404	27	1,085
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	0	775	53	8	635
Zone	3 Total/Ave.				775	0	0	0	0	775	53	8	635
System	2 Total/Ave.				3,072	0	0	0	0	2,687	457	21	1,720
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	0	14	3	454
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	0	1,000	17	4	431
3	LOCKER ROOM	1	1	714	714	374	0	0	0	0	14	11	114
Zone	1 Total/Ave.				2,450	374	0	0	0	1,000	45	4	998
9	STAIRS	1	1	169	169	0	0	0	0	169	0	0	0
Zone	5 Total/Ave.				169	0	0	0	0	169	0	0	0
System	3 Total/Ave.				2,619	374	0	0	0	1,169	45	4	998
Building					8,133	374	0	0	0	5,768	906	19	3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.095 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.419 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.240 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 5.77 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 31.23 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.4	57	1,125	-19,766	13	304	322.4	0	0	0.0	0	0
5 - 10	0.7	3	65	-39,532	18	440	644.9	0	0	0.0	0	0
10 - 15	1.1	2	47	-59,298	25	592	967.3	0	0	0.0	0	0
15 - 20	1.5	0	0	-79,063	8	189	1,289.8	0	0	0.0	0	0
20 - 25	1.8	4	86	-98,829	5	120	1,612.2	0	0	0.0	0	0
25 - 30	2.2	2	30	-118,595	5	118	1,934.6	0	0	0.0	0	0
30 - 35	2.6	0	0	-138,361	1	31	2,257.1	0	0	0.0	0	0
35 - 40	2.9	3	68	-158,127	1	16	2,579.5	0	0	0.0	0	0
40 - 45	3.3	2	43	-177,893	1	28	2,902.0	0	0	0.0	0	0
45 - 50	3.6	7	147	-197,659	3	62	3,224.4	72	5,088	0.0	0	0
50 - 55	4.0	8	161	-217,424	3	61	3,546.8	28	1,989	0.0	0	0
55 - 60	4.4	2	31	-237,190	18	420	3,869.3	0	0	0.0	0	0
60 - 65	4.7	8	155	-256,956	0	0	4,191.7	0	0	0.0	0	0
65 - 70	5.1	2	31	-276,722	0	0	4,514.2	0	0	0.0	0	0
70 - 75	5.5	0	0	-296,488	0	0	4,836.6	0	0	0.0	0	0
75 - 80	5.8	0	0	-316,254	0	0	5,159.0	0	0	0.0	0	0
80 - 85	6.2	0	0	-336,020	0	0	5,481.5	0	0	0.0	0	0
85 - 90	6.6	0	0	-355,786	0	0	5,803.9	0	0	0.0	0	0
90 - 95	6.9	0	0	-375,551	0	0	6,126.4	0	0	0.0	0	0
95 - 100	7.3	0	0	-395,317	0	0	6,448.8	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,379	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 4  
 WEATHERSTRIP & CAULKING

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature Range (F)	----- Zone Number -----					
	2	4	2	3	1	5
Max. Temp.	82.0	316.5	102.7	99.8	101.3	141.3
Mo./Hr.	7 24	12 24	7 22	7 21	8 19	8 19
Day Type	1	5	1	1	1	1
	..... Number of Hours .....					
Above 100	0	8,052	160	0	280	3,089
95 - 100	0	28	1,034	812	1,454	99
90 - 95	0	116	1,054	1,226	1,036	196
85 - 90	0	104	763	766	412	90
80 - 85	156	205	643	724	382	198
75 - 80	2,800	136	18	144	108	0
70 - 75	716	119	0	34	0	0
65 - 70	51	0	2,437	2,580	3,070	5,088
60 - 65	731	0	1,139	1,265	1,709	0
55 - 60	824	0	721	764	309	0
50 - 55	661	0	791	445	0	0
Below 50	2,821	0	0	0	0	0
Min. Temp.	32.1	68.0	54.9	54.9	58.4	67.3
Mo./Hr.	2 9	1 1	12 5	2 3	2 7	1 6
Day Type	5	1	1	3	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC	DEMAND	OIL
	Off Peak (kWh)	On Peak (kW)	
Jan	3,037	10	577
Feb	2,757	10	573
March	2,834	10	365
April	2,624	10	170
May	4,321	17	0
June	4,952	18	0
July	6,099	18	0
Aug	5,093	18	0
Sept	4,180	17	0
Oct	2,639	10	130
Nov	2,624	10	251
Dec	2,965	10	482
Total	44,125	18	2,548

Building Energy Consumption = 49,844 (Btu/Sq Ft/Year)  
Source Energy Consumption = 88,533 (Btu/Sq Ft/Year)

Floor Area = 8,133 (Sq Ft)



## ----- EQUIPMENT ENERGY CONSUMPTION -----

Ref Num	Equip Code	Monthly Consumption												Total	
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec		
0	LIGHTS														
	ELEC	2458	2220	2458	2379	3971	3843	3971	3971	3843	2458	2379	2458	36,409	
	PK	9.1	9.1	9.1	9.1	12.2	12.2	12.2	12.2	12.2	9.1	9.1	9.1	12.2	
1	MISC LD														
	ELEC	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	MISC LD														
	GAS	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	MISC LD														
	OIL	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	MISC LD														
	P STEAM	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
5	MISC LD														
	P HOTW20	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
6	MISC LD														
	P CHILL	0	0	0	0	0	0	0	0	0	0	0	0	0	
	PK	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	EQ1161		AIR-CLD COND COMP <15 TONS												
	ELEC	0	0	0	0	107	793	1696	798	102	0	0	0	3,496	
	PK	0.0	0.0	0.0	0.0	4.2	4.4	4.5	4.4	4.2	0.0	0.0	0.0	4.5	
1	EQ5200		CONDENSER FANS												
	ELEC	0	0	0	0	11	81	171	82	10	0	0	0	355	
	PK	0.0	0.0	0.0	0.0	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.4	
1	EQ5303		CONTROLS												
	ELEC	0	0	0	0	121	126	149	130	117	0	0	0	643	
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3	
1	EQ4003		FC CENTRIF. FAN C.V.												
	ELEC	0	0	0	0	112	108	112	112	108	0	0	0	553	
	PK	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.3	
1	EQ2005		OIL FIRE TUBE HOT WATER												
	OIL	577	573	365	170	0	0	0	0	0	130	251	482	2,548	
	PK	2.8	2.8	2.8	2.8	0.0	0.0	0.0	0.0	0.0	2.6	2.8	2.8	2.8	
1	EQ5020		HEAT WATER CIRC. PUMP C.V.												

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

ELEC	84	78	54	35	0	0	0	0	0	26	35	73	387
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5240	BOILER FORCED DRAFT FAN												
ELEC	116	108	76	49	0	0	0	0	0	36	49	102	537
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5307	BOILER CONTROLS												
ELEC	248	230	161	105	0	0	0	0	0	78	105	217	1,144
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1 EQ5040	FUEL OIL PUMP C.V.												
ELEC	131	121	85	55	0	0	0	0	0	41	55	114	603
PK	0.3	0.3	0.3	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3

UTILITY PEAK CHECKSUMS - ALTERNATIVE 4  
WEATHERSTRIP & CAULKING

----- U T I L I T Y   P E A K   C H E C K S U M S -----

Utility    ELECTRIC DEMAND

Peak Value        17.7    (kW)  
Yearly Time of Peak 15 (hr)    7 (mo)

Hour 15    Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Percent Of Tot (%)
----------------------	------------------------	-----------------------	---------------------------	--------------------------

Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

Lights			12.2	68.89
Base Utilities			0.0	0.00
Misc Equipment			0.0	0.00
Sub Total			12.2	68.89
Grand Total			17.7	100.00

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**          T R A C E    6 0 0    A N A L Y S I S          **  
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ENERGY SAVINGS OPPORTUNITY STUDY  
CARLISLE BARRACKS, PA  
DEPARTMENT OF THE ARMY  
BENATEC ASSOCIATES  
BUILDING 901

Weather File Code: CARLISLE  
Location: ENERGY SAVINGS OPPORTUNITY STUDY  
Latitude: 40.2 (deg)  
Longitude: 77.2 (deg)  
Time Zone: 5  
Elevation: 475 (ft)  
Barometric Pressure: 29.2 (in. Hg)

Summer Clearness Number: 1.00  
Winter Clearness Number: 1.00  
Summer Design Dry Bulb: 92 (F)  
Summer Design Wet Bulb: 72 (F)  
Winter Design Dry Bulb: 4 (F)  
Summer Ground Relectance: 0.20  
Winter Ground Relectance: 0.20

Air Density: 0.0742 (Lbm/cuft)  
Air Specific Heat: 0.2444 (Btu/lbm/F)  
Density-Specific Heat Prod: 1.0882 (Btu-min./hr/cuft/F)  
Latent Heat Factor: 4,790.2 (Btu-min./hr/cuft)  
Enthalpy Factor: 4.4519 (Lb-min./hr/cuft)

Design Simulation Period: May To September  
System Simulation Period: January To December  
Cooling Load Methodology: CLTD/CLF (Transfer Function Method)

Time/Date Program was Run: 13: 6: 8 1/17/94  
Dataset Name: CB901B .TM

AIRFLOW - ALTERNATIVE 1  
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----  
(Design Airflow Quantities)

System Number	System Type	Main					Auxil. Supply Airflow (Cfm)	Room Exhaust Airflow (Cfm)
		Outside Airflow (Cfm)	Cooling Airflow (Cfm)	Heating Airflow (Cfm)	Return Airflow (Cfm)	Exhaust Airflow (Cfm)		
1	SZ	0	3,248	3,248	3,965	717	0	0
2	RAD	0	0	0	0	875	0	0
3	UH	0	0	3,201	0	569	0	0
Totals		0	3,248	6,449	3,965	2,161	0	0

CAPACITY - ALTERNATIVE 1  
COMBINED ECOS

----- S Y S T E M S U M M A R Y -----  
(Design Capacity Quantities)

		Cooling				Heating						
		Main Sys.	Aux. Sys.	Opt. Vent	Cooling	Main Sys.	Aux. Sys.	Preheat	Reheat	Humidif.	Opt. Vent	Heating
System	System	Capacity	Capacity	Capacity	Totals	Capacity	Capacity	Capacity	Capacity	Capacity	Capacity	Totals
Number	Type	(Tons)	(Tons)	(Tons)	(Tons)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(Btuh)
	1 SZ	4.9	0.0	0.0	4.9	-106,192	0	0	0	0	0	-106,192
	2 RAD	0.0	0.0	0.0	0.0	-101,019	0	0	0	0	0	-101,019
	3 UH	0.0	0.0	0.0	0.0	-55,994	0	0	0	0	0	-55,994
Totals		4.9	0.0	0.0	4.9	-263,205	0	0	0	0	0	-263,205

The building peaked at hour 14 month 7 with a capacity of 4.9 tons

ENGINEERING CHECKS - ALTERNATIVE 1  
COMBINED ECOS

----- E N G I N E E R I N G C H E C K S -----

System Number	Main/ Auxiliary	System Type	Percent Outside Air	Cooling				Heating		Floor Area Sq Ft
				Cfm/ Sq Ft	Cfm/ Ton	Sq Ft /Ton	Btuh/ Sq Ft	Cfm/ Sq Ft	Btuh/ Sq Ft	
1	Main	SZ	0.00	1.33	657.2	494.1	24.29	1.33	-43.49	2,442
2	Main	RAD	0.00	0.00	0.0	0.0	0.00	0.00	-32.88	3,072
3	Main	UH	0.00	0.00	0.0	0.0	0.00	1.22	-21.38	2,619

System 1 Peak SZ - SINGLE ZONE

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 7/14 \* Mo/Hr: 7/15 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 91/ 74/105.0 \* OADB: 91 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret: Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads												
Skylite Solr	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	1,640	0	0	1,640	2.77	*	1,994	4.21	*	-4,646	-4,646	4.41
Glass Solar	11,853	0	0	11,853	19.99	*	13,082	27.63	*	0	0	0.00
Glass Cond	4,849	0	0	4,849	8.18	*	5,137	10.85	*	-24,753	-24,753	23.47
Wall Cond	887	6	0	893	1.51	*	1,059	2.24	*	-3,889	-3,914	3.71
Partition	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	23,717	0	0	23,717	39.99	*	12,481	26.36	*	-49,923	-49,923	47.34
Sub Total==>	42,946	6	0	42,951	72.42	*	33,752	71.28	*	-83,211	-83,236	78.93
Internal Loads												
Lights	11,334	0	0	11,334	19.11	*	11,431	24.14	*	0	0	0.00
People	4,560	0	0	4,560	7.69	*	2,141	4.52	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	15,893	0	0	15,893	26.80	*	13,573	28.66	*	0	0	0.00
Ceiling Load	54	-54	0	0	0.00	*	26	0.05	*	-154	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				462	0.78	*		0.00	*		0	0.00
Ret. Fan Heat		0	0	0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0	0	0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0	0	0	0	-0.00	*	0	-0.00	*	-22,222	-22,222	21.07
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	58,893	-49	0	59,306	100.00	*	47,351	100.00	*	-105,587	-105,458	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf) (%) Part ExFlr Roof Wall
Main Clg	4.9	59.3	3,248	75.1 65.6 81.6	61.5 59.9 76.7	2,442	0 0 0
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0	0 0 0
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0	0 0 0
Totals	4.9	59.3				1,912	404 27

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-106.2	3,248	67.8	97.9	Vent	0	0	Clg Cfm/Sqft	1.33	SADB	61.6	97.9
Aux Htg	0.0	0	0.0	0.0	Infil	717	717	Clg Cfm/Ton	657.15	Plenum	75.4	66.7
Preheat	-0.0	3,248	67.8	61.5	Supply	3,248	3,248	Clg Sqft/Ton	494.11	Return	75.1	67.8
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	24.29	Ret/DA	75.1	67.8
Humidif	0.0	0	0.0	0.0	Return	3,248	3,248	No. People	8	Runarnd	75.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-106.2				Rm Exh	0	0	Htg Cfm/SqFt	1.33	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/SqFt	-43.49	Fn Frict	0.1	0.0

System 2 Block RAD - RADIATION

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*  
Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-6,257	-6,257	6.19
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-27,600	-27,600	27.32
Wall Cond	0	0		0	0.00	*	0	0.00	*	-6,197	-6,211	6.15
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-60,952	-60,952	60.34
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-101,005	-101,019	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	-3,497	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-104,502	-101,019	100.00

-----COOLING COIL SELECTION-----										-----AREAS-----		
	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR			Leaving DB/WB/HR			Gross Total	Glass (sf)	(%)
				Deg F	Deg F	Grains	Deg F	Deg F	Grains	Floor	3,072	
Main Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Part	0	
Aux Clg	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0	
Opt Vent	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	2,687	0 0
Totals	0.0	0.0								Wall	2,177	457 21

-----HEATING COIL SELECTION-----					-----AIRFLOWS (cfm)-----			--ENGINEERING CHECKS--		--TEMPERATURES (F)---		
	Capacity	Coil Airfl	Ent	Lvg	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
	(Mbh)	(cfm)	Deg F	Deg F	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	68.1
Main Htg	-101.0	0	0.0	0.0	Infil	0	875	Clg Cfm/Ton	0.00	Plenum	0.0	39.6
Aux Htg	0.0	0	0.0	0.0	Supply	0	0	Clg Sqft/Ton	0.00	Return	0.0	68.0
Preheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Reheat	0.0	0	0.0	0.0	Return	0	0	No. People	0	Runarnd	0.0	68.0
Humidif	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Opt Vent	0.0	0	0.0	0.0	Rm Exh	0	0	Htg Cfm/SqFt	0.00	Fn BldTD	0.0	0.0
Total	-101.0				Auxil	0	0	Htg Btuh/SqFt	-32.88	Fn Frict	0.0	0.0

System 3 Block UH - UNIT HEATERS

\*\*\*\*\* COOLING COIL PEAK \*\*\*\*\* CLG SPACE PEAK \*\*\*\*\* HEATING COIL PEAK \*\*\*\*\*

Peaked at Time ==> Mo/Hr: 0/ 0 \* Mo/Hr: 0/ 0 \* Mo/Hr: 13/ 1  
Outside Air ==> OADB/WB/HR: 0/ 0/ 0.0 \* OADB: 0 \* OADB: 4

	Space Sens.+Lat. (Btuh)	Ret. Air Sensible (Btuh)	Ret. Air Latent (Btuh)	Net Total (Btuh)	Perct Of Tot (%)	*	Space Sensible (Btuh)	Perct Of Tot (%)	*	Space Peak Space Sens (Btuh)	Coil Peak Tot Sens (Btuh)	Perct Of Tot (%)
Envelope Loads						*			*			
Skylite Solr	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Skylite Cond	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Roof Cond	0	0		0	0.00	*	0	0.00	*	-2,734	-2,734	4.88
Glass Solar	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Glass Cond	0	0		0	0.00	*	0	0.00	*	-2,402	-2,402	4.29
Wall Cond	0	0		0	0.00	*	0	0.00	*	-11,197	-11,197	20.00
Partition	0			0	0.00	*	0	0.00	*	0	0	0.00
Exposed Floor	0			0	0.00	*	0	0.00	*	0	0	0.00
Infiltration	0			0	0.00	*	0	0.00	*	-39,661	-39,661	70.83
Sub Total==>	0	0		0	0.00	*	0	0.00	*	-55,994	-55,994	100.00
Internal Loads						*			*			
Lights	0	0		0	0.00	*	0	0.00	*	0	0	0.00
People	0			0	0.00	*	0	0.00	*	0	0	0.00
Misc	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sub Total==>	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Ceiling Load	0	0		0	0.00	*	0	0.00	*	0	0	0.00
Outside Air	0	0	0	0	0.00	*	0	0.00	*	0	0	0.00
Sup. Fan Heat				0	0.00	*		0.00	*		0	0.00
Ret. Fan Heat		0		0	0.00	*		0.00	*		0	0.00
Duct Heat Pkup		0		0	0.00	*		0.00	*		0	0.00
OV/UNDR Sizing	0			0	0.00	*	0	0.00	*	0	0	0.00
Exhaust Heat		0	0	0	0.00	*		0.00	*		0	0.00
Terminal Bypass		0	0	0	0.00	*		0.00	*		0	0.00
Grand Total==>	0	0	0	0	0.00	*	0	0.00	*	-55,994	-55,994	100.00

-----COOLING COIL SELECTION-----

	Total Capacity (Tons)	Sens Cap. (Mbh)	Coil Airfl (cfm)	Entering DB/WB/HR Deg F Deg F Grains	Leaving DB/WB/HR Deg F Deg F Grains	Gross Total Floor	Glass (sf)	(%)
Main Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	2,619		
Aux Clg	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	374		
Opt Vent	0.0	0.0	0	0.0 0.0 0.0	0.0 0.0 0.0	0		
Totals	0.0	0.0				1,169	0	0
						1,043	45	4

-----HEATING COIL SELECTION-----

	Capacity (Mbh)	Coil Airfl (cfm)	Ent Deg F	Lvg Deg F	Type	Cooling	Heating	Clg % OA	0.0	Type	Clg	Htg
Main Htg	-56.0	3,201	68.0	84.1	Vent	0	0	Clg Cfm/Sqft	0.00	SADB	0.0	84.1
Aux Htg	0.0	0	0.0	0.0	Infil	0	569	Clg Cfm/Ton	0.00	Plenum	0.0	68.0
Preheat	0.0	0	0.0	0.0	Supply	0	3,201	Clg Sqft/Ton	0.00	Return	0.0	68.0
Reheat	0.0	0	0.0	0.0	Mincfm	0	0	Clg Btuh/Sqft	0.00	Ret/OA	0.0	68.0
Humidif	0.0	0	0.0	0.0	Return	0	3,201	No. People	0	Runarnd	0.0	68.0
Opt Vent	0.0	0	0.0	0.0	Exhaust	0	0	Htg % OA	0.0	Fn MtrTD	0.0	0.0
Total	-56.0				Rm Exh	0	0	Htg Cfm/Sqft	1.22	Fn BldTD	0.0	0.0
					Auxil	0	0	Htg Btuh/Sqft	-21.38	Fn Frict	0.0	0.0

-----AIRFLOWS (cfm)-----

-----ENGINEERING CHECKS-----

-----TEMPERATURES (F)-----



BUILDING U-VALUES - ALTERNATIVE 1  
COMBINED ECOS

----- B U I L D I N G U - V A L U E S -----

Room Number	Description	Room U-Values (Btu/hr/sqft/F)									Room Mass (lb/ sqft)	Room Capac. (Btu/ sqft/F)
		Part.	ExFlr	Summr Skylt	Wintr Skylt	Roof	Summr Windo	Wintr Windo	Wall	Ceil.		
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.055	0.317	21.8	4.37
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.056	0.000	45.9	9.38
6	LOUNGE	0.000	0.000	0.000	0.000	0.038	0.956	0.995	0.057	0.000	42.7	12.41
Zone 2	Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	40.0	10.26
8	OFFICE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
Zone 4	Total/Ave.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	13.3	2.67
System 1	Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	38.4	9.81
4	OLD PRO SHOP	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.055	0.317	21.8	4.37
5	NEW PRO SHOP	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.056	0.000	45.9	9.38
6	LOUNGE	0.000	0.000	0.000	0.000	0.038	0.956	0.995	0.057	0.000	42.7	12.41
Zone 2	Total/Ave.	0.000	0.000	0.000	0.000	0.038	0.921	0.957	0.056	0.317	40.0	10.26
7	TOILETS, LOCKERS	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.057	0.000	55.7	11.91
Zone 3	Total/Ave.	0.000	0.000	0.000	0.000	0.032	0.810	0.837	0.057	0.000	55.7	11.91
System 2	Total/Ave.	0.000	0.000	0.000	0.000	0.036	0.908	0.943	0.057	0.317	44.0	10.67
1	LOCKER & MAINTNC	0.000	0.000	0.000	0.000	0.000	0.810	0.837	0.057	0.000	38.2	7.65
2	CART MAINTENANCE	0.000	0.000	0.000	0.000	0.037	0.810	0.837	0.331	0.000	43.2	8.83
3	LOCKER ROOM	0.275	0.000	0.000	0.000	0.000	0.810	0.837	0.057	0.000	39.7	7.93
Zone 1	Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.175	0.000	40.7	8.21
9	STAIRS	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	22.5	5.28
Zone 5	Total/Ave.	0.000	0.000	0.000	0.000	0.032	0.000	0.000	0.000	0.000	22.5	5.28
System 3	Total/Ave.	0.275	0.000	0.000	0.000	0.037	0.810	0.837	0.175	0.000	39.5	8.03
Building		0.275	0.000	0.000	0.000	0.037	0.909	0.944	0.088	0.317	40.9	9.56

BUILDING AREAS - ALTERNATIVE 1  
COMBINED ECOS

----- B U I L D I N G   A R E A S -----													
Room Number	Description	Number of Duplicate Flr	Rm	Floor Area/Dupl Room (sqft)	Total Floor Area (sqft)	Partition Area (sqft)	Exposed Floor Area (sqft)	Skylight Area (sqft)	Skl /Rf (%)	Net Roof Area (sqft)	Window Area (sqft)	Win /Wl (%)	Net Wall Area (sqft)
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
8	OFFICE	1	1	145	145	0	0	0	0	0	0	0	0
Zone	4 Total/Ave.				145	0	0	0	0	0	0	0	0
System	1 Total/Ave.				2,442	0	0	0	0	1,912	404	27	1,085
4	OLD PRO SHOP	1	1	389	389	0	0	0	0	0	16	17	78
5	NEW PRO SHOP	1	1	600	600	0	0	0	0	600	81	23	274
6	LOUNGE	1	1	1,308	1,308	0	0	0	0	1,312	307	30	733
Zone	2 Total/Ave.				2,297	0	0	0	0	1,912	404	27	1,085
7	TOILETS, LOCKERS	1	1	775	775	0	0	0	0	775	53	8	635
Zone	3 Total/Ave.				775	0	0	0	0	775	53	8	635
System	2 Total/Ave.				3,072	0	0	0	0	2,687	457	21	1,720
1	LOCKER & MAINTNC	1	1	736	736	0	0	0	0	0	14	3	454
2	CART MAINTENANCE	1	1	1,000	1,000	0	0	0	0	1,000	17	4	431
3	LOCKER ROOM	1	1	714	714	374	0	0	0	0	14	11	114
Zone	1 Total/Ave.				2,450	374	0	0	0	1,000	45	4	998
9	STAIRS	1	1	169	169	0	0	0	0	169	0	0	0
Zone	5 Total/Ave.				169	0	0	0	0	169	0	0	0
System	3 Total/Ave.				2,619	374	0	0	0	1,169	45	4	998
Building					8,133	374	0	0	0	5,768	906	19	3,803

ASHRAE 90 ANALYSIS - ALTERNATIVE 1  
COMBINED ECOS

----- A S H R A E   9 0   A N A L Y S I S -----

Overall Roof U-Value = 0.037 (Btu/Hr/Sq Ft/F)  
Overall Wall U-Value = 0.246 (Btu/Hr/Sq Ft/F)  
Overall Building U-Value = 0.131 (Btu/Hr/Sq Ft/F)

Roof Overall Thermal Transfer Value (OTTVr) = 1.45 (Btu/Hr/Sq Ft)  
Wall Overall Thermal Transfer Value (OTTVw) = 24.62 (Btu/Hr/Sq Ft)

SYSTEM TOTALS LOAD PROFILE - ALTERNATIVE 1  
COMBINED ECOS

----- SYSTEM LOAD PROFILE -----

System Totals

Percent Design Load	---- Cooling Load ----			----- Heating Load -----			---- Cooling Airflow ----			---- Heating Airflow ----		
	Cap. (Ton)	Hours (%)	Hours	Capacity (Btuh)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours	Cap. (Cfm)	Hours (%)	Hours
0 - 5	0.2	50	988	-13,160	17	330	322.4	0	0	0.0	0	0
5 - 10	0.5	0	0	-26,321	14	269	644.9	0	0	0.0	0	0
10 - 15	0.7	3	62	-39,481	16	309	967.3	0	0	0.0	0	0
15 - 20	1.0	3	61	-52,641	5	104	1,289.8	0	0	0.0	0	0
20 - 25	1.2	5	95	-65,801	6	125	1,612.2	0	0	0.0	0	0
25 - 30	1.5	2	31	-78,962	2	43	1,934.6	0	0	0.0	0	0
30 - 35	1.7	2	42	-92,122	0	0	2,257.1	0	0	0.0	0	0
35 - 40	2.0	3	50	-105,282	0	0	2,579.5	0	0	0.0	0	0
40 - 45	2.2	3	61	-118,442	10	196	2,902.0	0	0	0.0	0	0
45 - 50	2.5	12	245	-131,603	4	68	3,224.4	72	5,088	0.0	0	0
50 - 55	2.7	3	60	-144,763	5	97	3,546.8	28	1,989	0.0	0	0
55 - 60	3.0	6	124	-157,923	20	389	3,869.3	0	0	0.0	0	0
60 - 65	3.2	4	77	-171,083	0	0	4,191.7	0	0	0.0	0	0
65 - 70	3.5	2	31	-184,244	0	0	4,514.2	0	0	0.0	0	0
70 - 75	3.7	3	62	-197,404	0	0	4,836.6	0	0	0.0	0	0
75 - 80	4.0	0	0	-210,564	0	0	5,159.0	0	0	0.0	0	0
80 - 85	4.2	0	0	-223,724	0	0	5,481.5	0	0	0.0	0	0
85 - 90	4.4	0	0	-236,885	0	0	5,803.9	0	0	0.0	0	0
90 - 95	4.7	0	0	-250,045	0	0	6,126.4	0	0	0.0	0	0
95 - 100	4.9	0	0	-263,205	0	0	6,448.8	0	0	0.0	0	0
Hours Off	0.0	0	6,771	0	0	6,830	0.0	0	1,683	0.0	0	8,760

BUILDING TEMPERATURE PROFILES - ALTERNATIVE 1  
COMBINED ECOS

----- B U I L D I N G   T E M P E R A T U R E   P R O F I L E S -----

Temperature	----- Zone Number -----					
Range	2	4	2	3	1	5
(F)						

Max. Temp.	80.5	316.5	106.1	111.2	104.9	166.5
Mo./Hr.	7 24	12 24	8 19	8 19	8 19	9 19
Day Type	1	5	1	1	1	1

	..... Number of Hours .....					
Above 100	0	8,052	1,304	2,392	1,404	3,125
95 - 100	0	28	1,197	536	1,368	67
90 - 95	0	116	418	44	257	156
85 - 90	0	104	341	208	167	108
80 - 85	30	205	268	325	296	216
75 - 80	3,093	136	144	579	180	0
70 - 75	549	119	51	102	0	0
65 - 70	170	0	2,496	2,549	3,540	5,088
60 - 65	692	0	1,344	1,462	1,548	0
55 - 60	861	0	780	563	0	0
50 - 55	461	0	417	0	0	0
Below 50	2,904	0	0	0	0	0

Min. Temp.	33.6	68.0	54.9	55.4	60.6	67.6
Mo./Hr.	2 8	1 1	1 4	2 8	2 7	1 6
Day Type	5	1	2	5	1	1

MONTHLY ENERGY CONSUMPTION - ALTERNATIVE 1  
COMBINED ECOS

----- MONTHLY ENERGY CONSUMPTION -----

Month	ELEC Off Peak (kWh)	DEMAND On Peak (kW)	OIL (Therm)
Jan	2,862	10	383
Feb	2,597	10	382
March	2,707	10	244
April	2,529	10	101
May	4,317	17	0
June	4,786	18	0
July	5,658	18	0
Aug	4,930	18	0
Sept	4,186	17	0
Oct	2,582	10	53
Nov	2,559	10	163
Dec	2,817	10	318
Total	42,532	18	1,644

Building Energy Consumption = 38,057 (Btu/Sq Ft/Year)  
Source Energy Consumption = 74,823 (Btu/Sq Ft/Year)

Floor Area = 8,133 (Sq Ft)

## ----- EQUIPMENT ENERGY CONSUMPTION -----

[illegible]

EQUIPMENT ENERGY CONSUMPTION - ALTERNATIVE 1  
 COMBINED ECOS

ELEC	68	64	42	25	0	0	0	0	0	21	30	61	311
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5240	BOILER FORCED DRAFT FAN												
ELEC	63	59	39	24	0	0	0	0	0	19	28	56	289
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2
1 EQ5307	BOILER CONTROLS												
ELEC	201	188	124	75	0	0	0	0	0	62	90	179	920
PK	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5
1 EQ5040	FUEL OIL PUMP C.V.												
ELEC	71	66	44	26	0	0	0	0	0	22	32	63	324
PK	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.2	0.2

UTILITY PEAK CHECKSUMS - ALTERNATIVE 1  
COMBINED ECOS

----- UTILITY PEAK CHECKSUMS -----

Utility ELECTRIC DEMAND

Peak Value 17.7 (kW)  
Yearly Time of Peak 15 (hr) 7 (mo)

Hour 15 Month 7

Eqp. Ref. Num.	Equipment Code Name	Equipment Description	Utility Demand (kW)	Perct Of Tot (%)
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Cooling Equipment

1	EQ1161	AIR-CLD COND COMP <15 TONS	5.2	29.54
Sub Total			5.2	29.54
Sub Total			0.0	0.00

Air Moving Equipment

1		SUMMATION OF FAN ELECTRICAL DEMAND	0.3	1.57
Sub Total			0.3	1.57
Sub Total			0.0	0.00

Miscellaneous

Lights	12.2	68.89
Base Utilities	0.0	0.00
Misc Equipment	0.0	0.00
Sub Total	12.2	68.89
Grand Total	17.7	100.00